

Canon[®] AL-1

REPAIR GUIDE

P R E F A C E

This Repair Guide is issued as a part of the Service Manual for the Canon AL-1. Its purpose is to insure the continued high quality of the camera through correct repair procedures.

The Tools List is also included on this microfiche, which is titled the Repair Instructions. Separate microfiche titled Parts Catalog and General complete the Service Manual. The main sheet number for all sheets is C-054. This and the General microfiche also have a suffix number -1E. The 1 indicates the first sheet of a possible series and the E indicates that the language is English.

Any comments or suggestions will be appreciated.

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INTRODUCTION

1. Special Repair Instructions

1.1. Exposure and Winding adjustments are identical to the AV-1. Normally they would not have been included, but they have been.

1.2. Instructions concerning the Focus adjustments.

A. DO NOT REVERSE THE POLARITY ON THE D.C.-D.C. CONVERTOR when attaching a power supply. If polarity is reversed the capacitor in the converter will explode.

B. To determine if the camera focusing is defective or the subject is not suitable, check the camera by focusing on a chart.

C. A D.C. power supply to power the chart illumination is very helpful, and the chart should not be lit by and A.C. light source.

D. As with the AF 514XL-S and AF 35 M, the best distance for test is 2.5 to 3 meters.

2. Glossary of Terms

Terms new to Canon service literature are listed below.

JUST FOCUS: The signal, indicator, and conditions which cause the center, green focus indicator to light. This indicates that the lens is correctly focused.

FRONT FOCUS: The signal, indicator, and conditions which cause the right, red focus indicator to light. This indicates that the lens is focused in front of the subject.

REAR FOCUS : The signal, indicator, and conditions which cause the left, red focus indicator to light. This indicates that the lens is focused behind the subject.

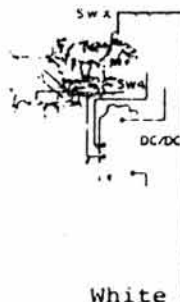
1. ASSEMBLY and DISASSEMBLY

1. Covers

Assembly and Disassembly Notes

1. Be careful with the top cover leads to the hot shoe.

2. Don't loose the Shutter Release Rod (23)-1.



Adjustment Notes

1. When removing the top cover, check the position of the S-L lever [shown dotted between (14) and (15)]. It must not be set at the S position.

2. Correctly align the shutter dial and shutter speed wiper when installing the top cover.

3. Check self timer operation after installing the top cover.

Adjustment Tolerances (See parts catalog for adjusting sizes)

1. Washers (9) & (10) are used to remove thrust play and wobble from the shutter dial (11).

Tolerance limit: 0.5mm on circumference

2. Shoulder screw (14) is used to remove thrust play from the finger rest. Tolerance limit: 0.3mm and no scraping sound when the winding lever is moved

3. Ring (15) is used to prevent space between the winding lever and S-L lever. Maximum space tolerance: 0.3mm

4. Spring washer (17) is used to adjust the feel of the winding lever.

5. Release pin (23)-1 is used to adjust the release stroke.

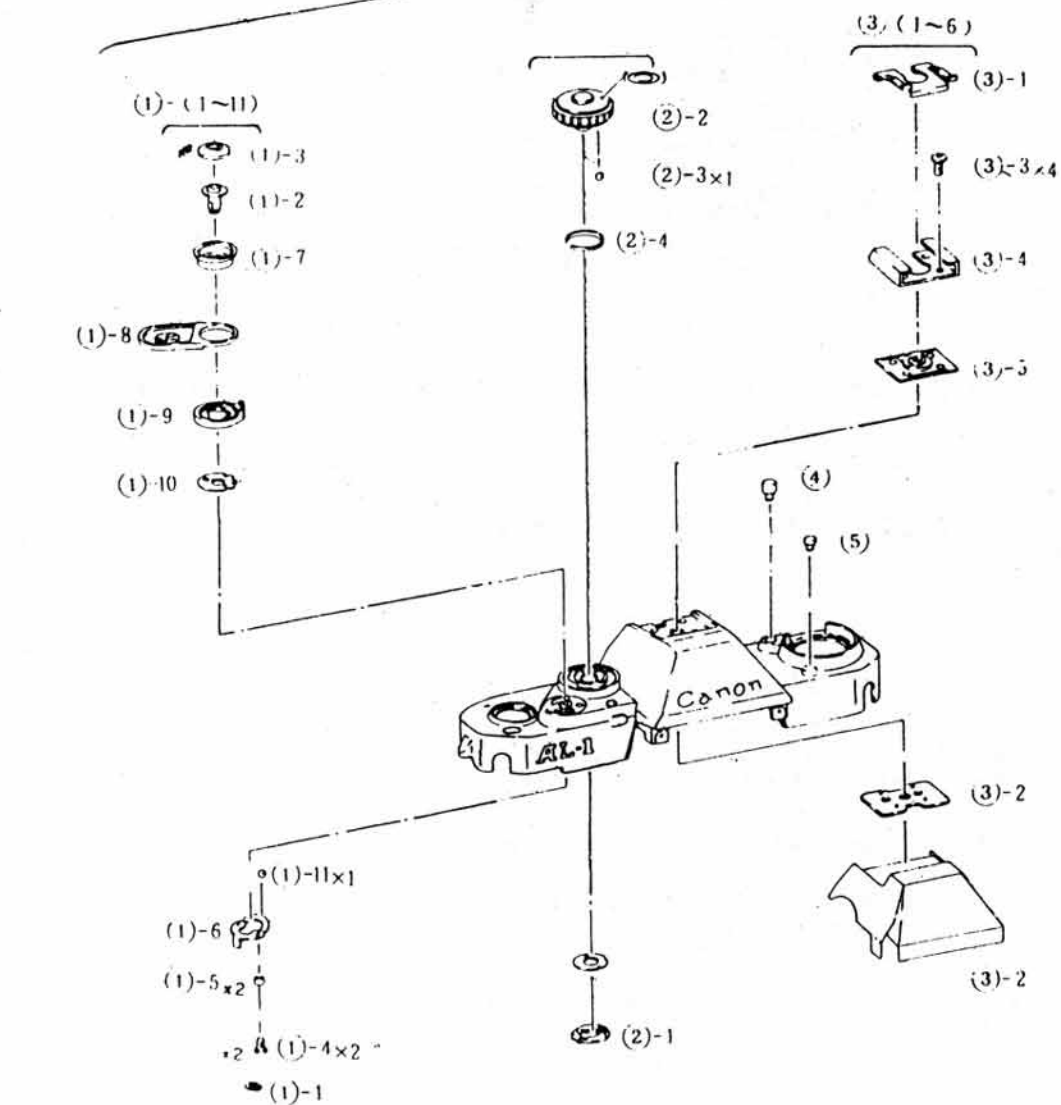
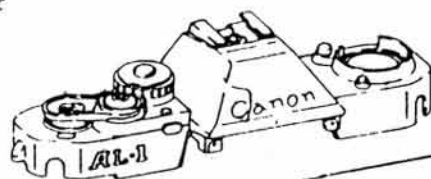
Release Stroke: SW1 = 0.1 to 0.5 mm

SW2 = 0.6 to 0.10mm

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

2. Top Cover



(1)-5	SIZE
1/4"	50mm (10161)
1/2"	70mm (10171) Mo...
3/4"	80mm (10181)

(1)-6	SIZE
1/4"	0.8mm (10181) Mo...
1/2"	0.20mm (10201)

(2)-1	SIZE
1/4"	35mm (10351)
1/2"	45mm (10451)

(2)-4	SIZE
1/4"	0.30mm (10301)
1/2"	0.35mm (10351)

Numbers (1) ~ (5)

I. ASSEMBLY and DISASSEMBLY

2. Top Cover

Assembly and Disassembly Notes

Buttons (4) & (5) are heat riveted in place.

Adjustment Notes

Adjustment Tolerances (See parts catalog for adjusting sizes)

1. Click Collar (1)-5 is used to adjust S-L click torque and remove play from the Shutter Button Seat (1)-7.

Tolerance limit: 0.3mm

2. Self-timer Activator (1)-6 is used to adjust the S-L lever click torque to between 200 and 350 g.

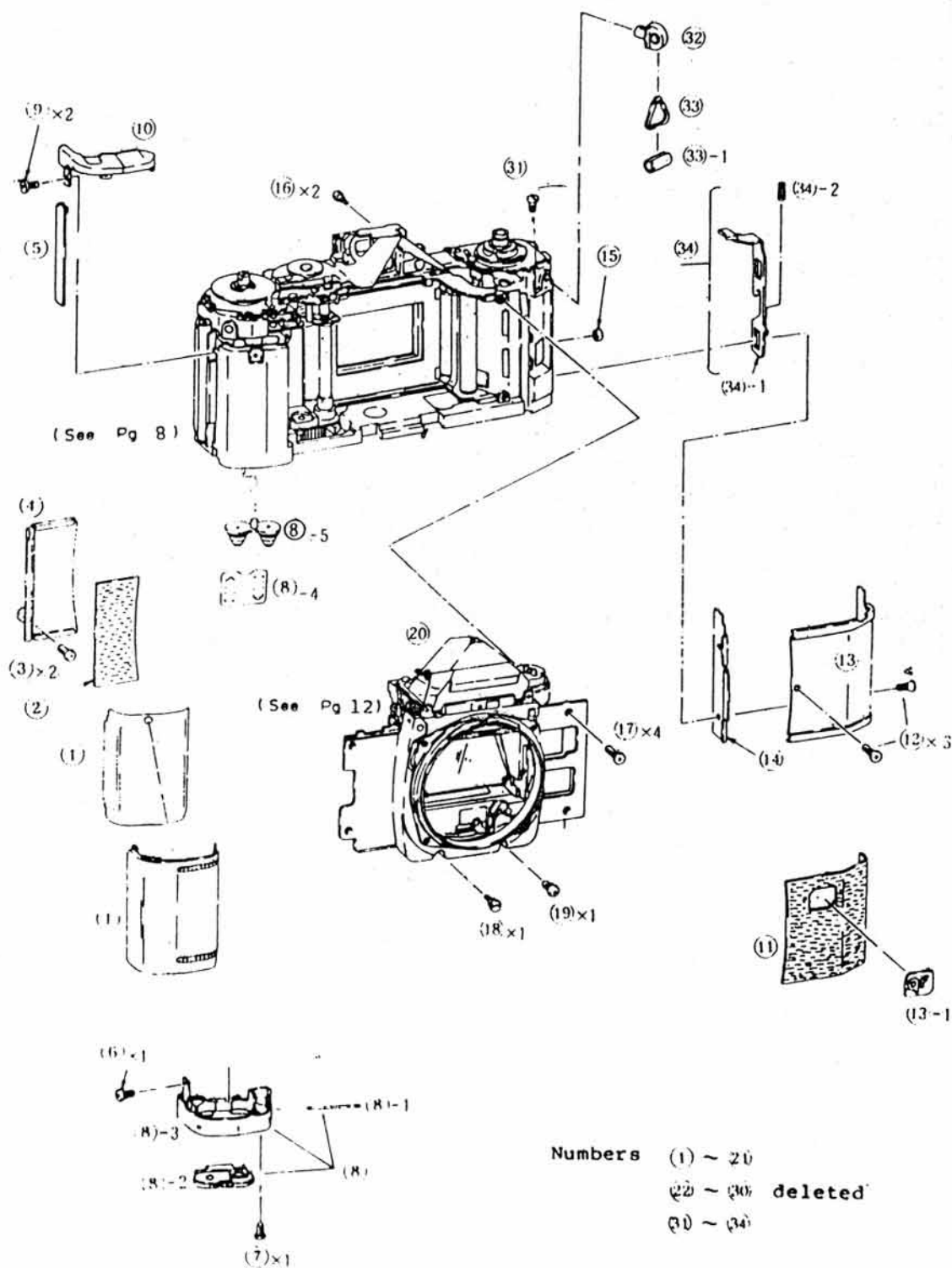
3. Shutter Dial Coupler (2)-1 is used to adjust shutter dial thrust play to within 0.2 to 0.3mm, and to adjust the feel.

4. Washer (2)-4 adjust the shutter dial click torque to 300 +- 150g.

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

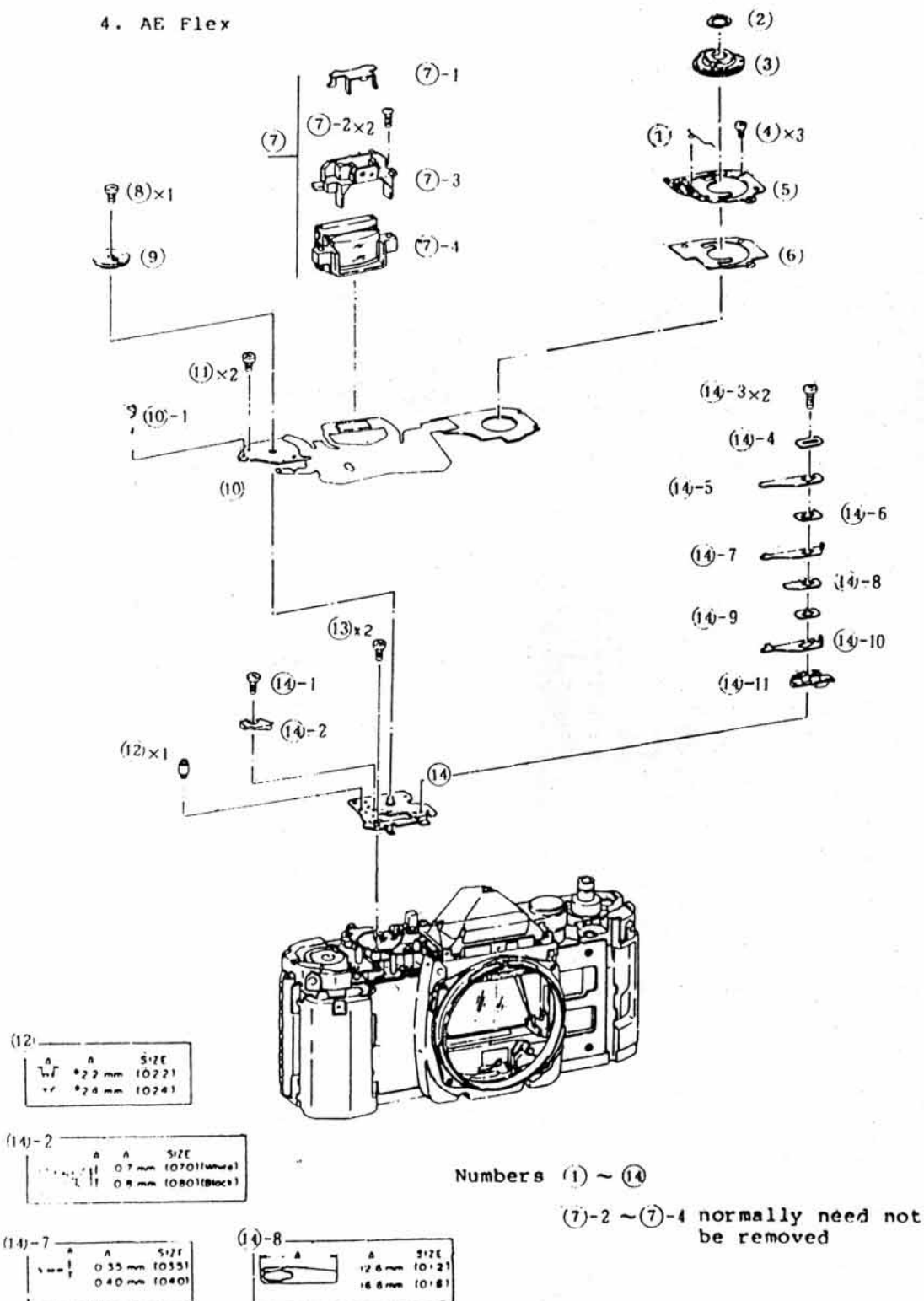
I. ASSEMBLY and DISASSEMBLY

3. Front Panel Removal



I. ASSEMBLY and DISASSEMBLY

4. AE Flex



1. ASSEMBLY and DISASSEMBLY

4. AE Flex

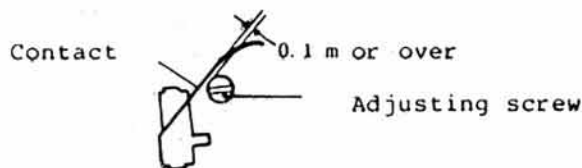
Assembly and Disassembly Notes

1. When removing the AF flex (10), don't bend the self-timer contact.
2. It is not normally necessary to remove numbers (7)-2 through (7)-4.

Adjustment Notes

Adjustment Tolerances (See parts catalog
for adjusting sizes)

1. Shoulder screw (10) is used to adjust the self-timer contact spacing. Tolerance limit: 0.1mm or over (SIZE 022 is standard size)



2. Stopper (14)-2 is used to adjust the release switch contact height. The height is measured from the shutter dial base.

Tolerance limit: SW1 ON: 1.35 \pm 0.15mm
SW2 ON: 0.85 \pm 0.15

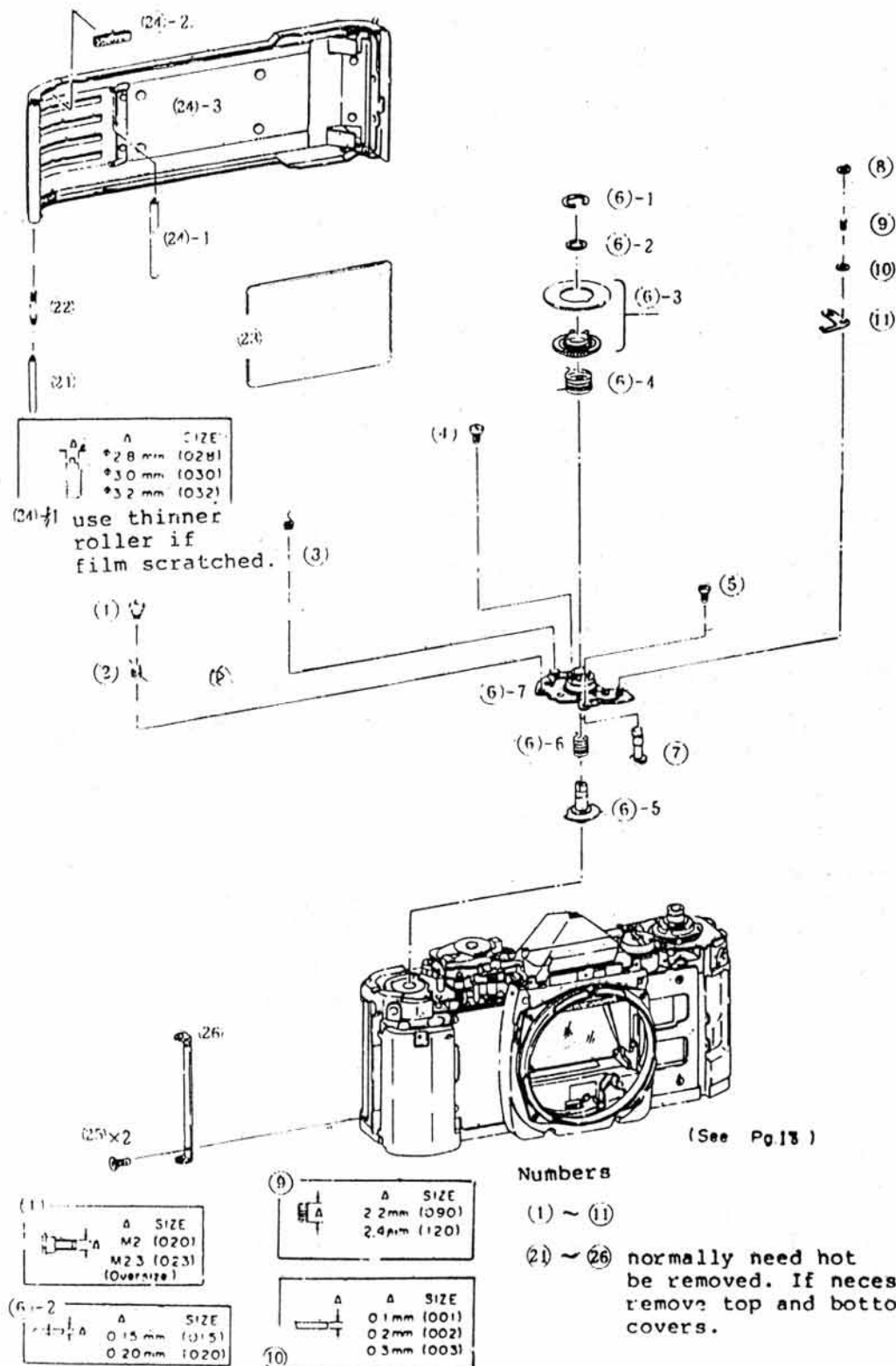
3. Release Contact No. 2 (14)-7 is used to adjust the release pressure.

Tolerance limit: SW1 ON: 70 \pm 20g
SW2 ON: 600 \pm 100g
SW1-SW2 separation: at least 0.2mm
Overtravel: at least 0.3mm

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

5. Back Cover, Winding Base



1. ASSEMBLY and DISASSEMBLY

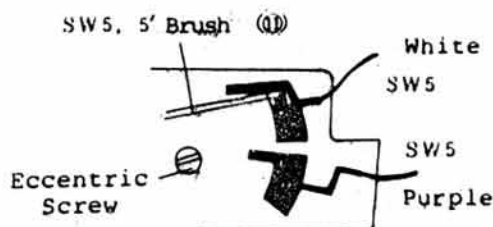
5. Back Cover, Winding Base

Assembly and Disassembly Notes

1. When removing the counter dial (6)-3, don't bend the self-timer contact.
2. When removing (1) and (4), first loosen (2) and (3).
3. It is not normally necessary to remove numbers (21) through (26).

Adjustment Notes

SW5-5' Brush Position Adjustment



1. When the winding stopper is in one of the three blank spots on the winding gear, the wiper brush (11) must be on the SW5' pattern.
2. When the shutter is wound, the brush should be on the SW5 pattern and aligned with the white leads soldering land. (Exact alignment is not critical).
3. Adjust with the eccentric screw.

Adjustment Tolerances (See parts catalog
for adjusting sizes)

1. An oversized screw (1) is available in case of stripped threads.
2. Washer (6)-2 is used to adjust film counter (6)-3 vertical play.

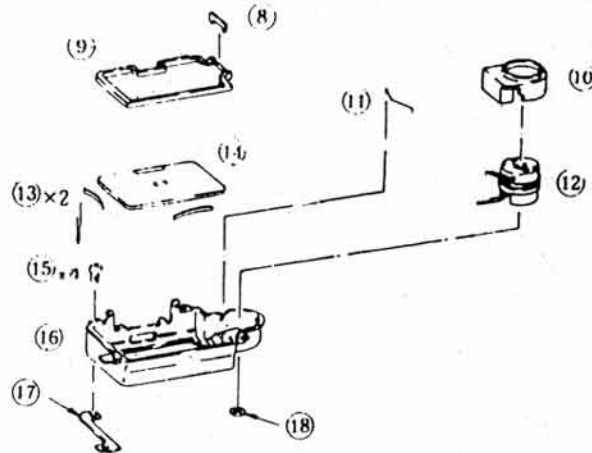
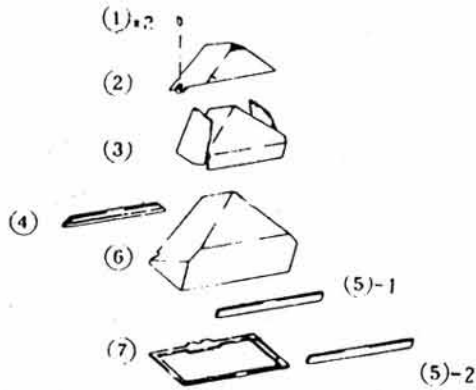
Tolerance limit: 0.5mm

3. Spring (9) and washer (10) are used to adjust the pressure of the SW5-5' pattern brush(1).

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

6. Finder Optics, Meter



(5)-2

	Δ	SIZE
t	0.15 mm	(015)
	0.25 mm	(025)

(5)-1

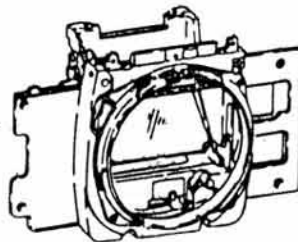
	Δ	SIZE
t	0.3 mm	(030)
	0.5 mm	(050)

(13)

	Δ	SIZE
t	0.05 mm	(005)
	0.10 mm	(010)

(17) (18)

	Δ	SIZE
t	0.05 mm	(005)
	0.10 mm	(010)
	0.15 mm	(015)
	0.20 mm	(020)
	0.25 mm	(025)
	0.30 mm	(030)
	0.35 mm	(035)
	0.40 mm	(040)



Numbers (1) ~ (18)

6. Finder Optics, Meter

Assembly and Disassembly Notes

1. Don't loose the focus washers (17) and (18).
2. Don't bend the meter needle.

Adjustment Notes

1. See section II.2.5 for meter (12) needle adjustment.
2. Apply dust gard tape to (6) and (16).
3. Install the focusing screen springs (13) in the order shown.



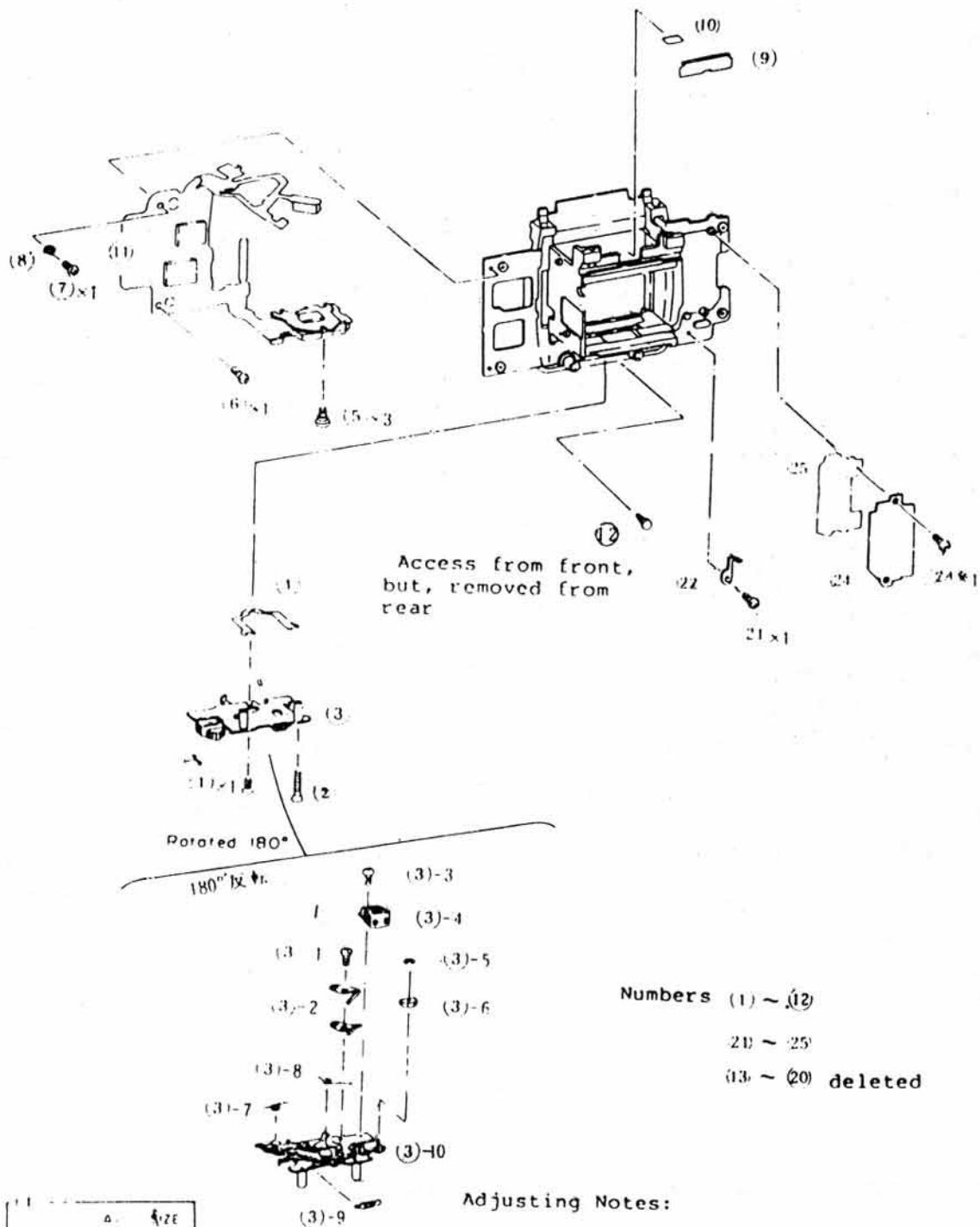
Adjustment Tolerances (See parts catalog for adjusting sizes)

1. (5)-1,2 are used to remove pentaprism play.
2. (13) x 2 are used to position the focusing screen. Larger "Sizes" are stronger.
3. (17) and (18) are focusing washers for the focusing screen.

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

7. IF Flex, Automatic Diaphragm Unit



Adjusting Notes:

- (4) is the CCD focus adjusting shim.
See section II.3.7.
- (10) is used to remove LCD vertical play.

1. ASSEMBLY and DISASSEMBLY

7. IF Flex, Automatic Diaphragm Unit

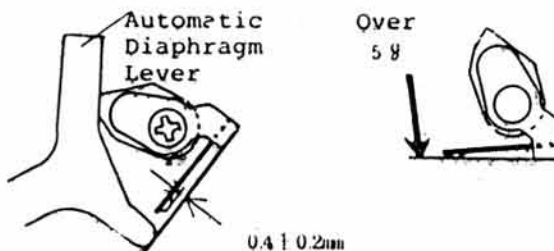
Assembly and Disassembly Notes

1. The three screws (5) are special flat-head screws. Do not mix them with standard type screws.
2. The IF flex (12) and D.C.-D.C. convertor (24) are connected by a yellow and a blue lead.
3. Contact (22) is soldered directly to (24).
4. Certain D.C.-D.C. convertors (24) are grounded with a wire instead of contact (22).

Adjustment Notes

1. DO NOT REVERSE THE LEADS BETWEEN (11) and (24)
2. When rebonding (11) and the LED with liquid gasket, be sure not to use excessive bond. If it runs, it may get on the focusing screen.
3. Indicator Contact Adjustment

3.1. With the automatic diaphragm lever in the start position, measure the contact spacing. It should be as shown below.

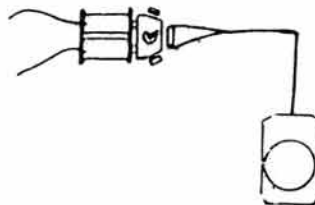


3.2. Contact Pressure should be over 5 g at the separation point.

4. Mg2 Check and Adjustment

4.1. Holding Power Check

Place a string around the end of the armature and measure force necessary to separate the armature from the magnet.



Tolerance limit: Over 150 g

4.2. Minimum Operating Voltage Check

Tolerance limit: 1.4 - 1.6 V (Under 1.7V)

Connect the magnet directly to a LVPS. Starting at 1.8V, reduce the voltage in 0.1 volt steps until the magnet fails to operate. Repeat the check three or four times.

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

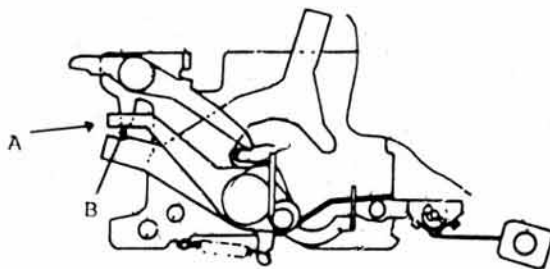
7. IF Flex, Automatic Diaphragm Unit (cont.)

Assembly and Disassembly Notes

4.3. Armature Spring Tension

Tolerance limit: 80 to 120 g

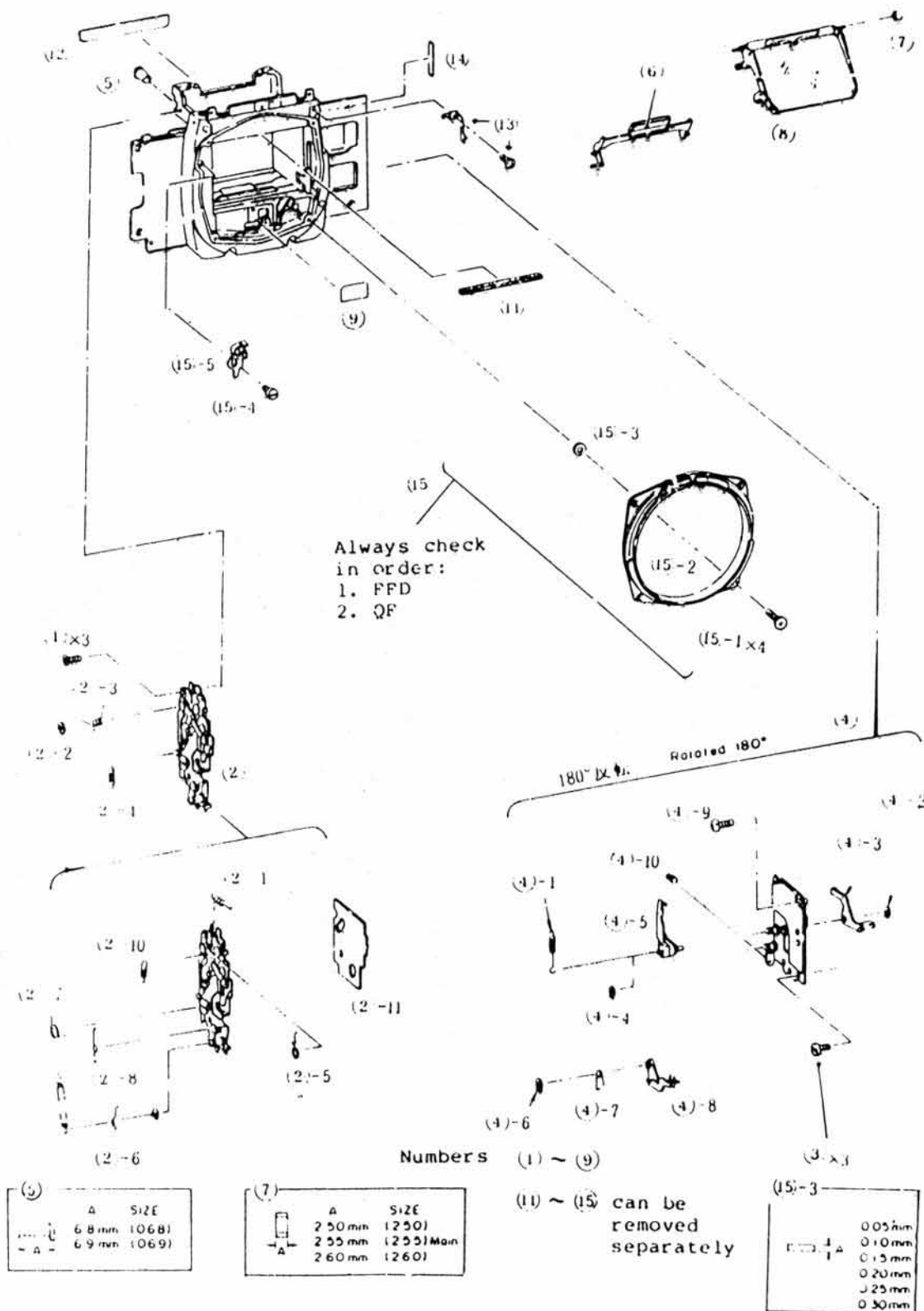
Press in the arrow marked direction (A) with a tension gage. Measure the tension when the edge of the lever is just even with the point (B) on the protrusion from the base.

Adjustment Tolerances (See parts catalog
for adjusting sizes)

1. (4) is used to adjust the CCD position. See section II.3.7.3.
2. (10) is used to remove vertical play from the LED.

1. ASSEMBLY and DISASSEMBLY

8. Mirror, Mirror Mechanism & AV Resistor



1. ASSEMBLY and DISASSEMBLY

8. Mirror, Mirror Mechanism & AV Resistor

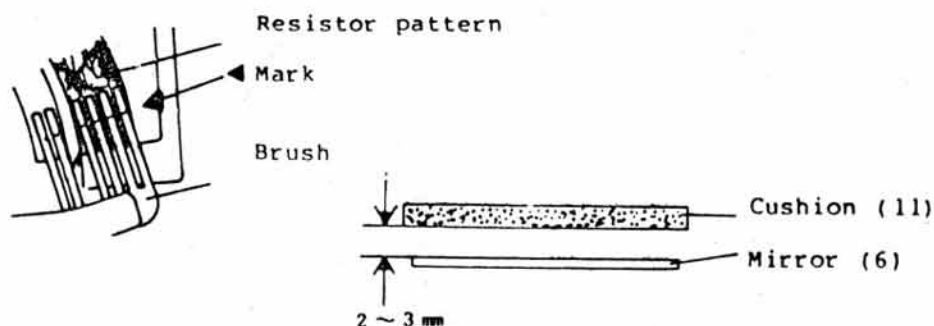
Adjustment Notes

1. AV Resistor Unit (4) Installation

1.1. The AV Resistor Unit is the same unit as is used in the AV-1 but improvements in individual parts tolerances have made adjustments unnecessary. (This is also true of present AV-1's.) But if either (4)-8 or (4)-10 is changed or moved, perform the following checks.

1.2. Check

The contact point of the brush (4)-8 should align with the triangular mark (part of the printed pattern) to the right of the resistor pattern. Adjust with screw (4)-10.



2. Main Mirror

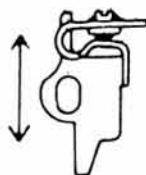
2.1. The fully up position of the main mirror should be at $0 + 0.2$ mm with respect to the lower edge of the shock absorbing cushion (11). (In other words, it should compress the cushion slightly). If this is not properly adjusted, the mirror may not return properly or there may be a light leak.

2.2. Curtain Release Point

The 1st curtain release should be released when the mirror is at a point two to three mm below the lower edge of the foam cushion (11).

2.3. Mirror Light Shield Closing

When looking through the film aperture, the light shield should be completely closed at least 0.1mm before the main mirror reaches the top of its travel. You can tell when the light shield is completely closed when you can no longer see reflections of the main mirror through the slit between the main and light shield. Adjust with (8) and (9).



Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

8. Mirror, Mirror Mechanism & AV Resistor (cont.)

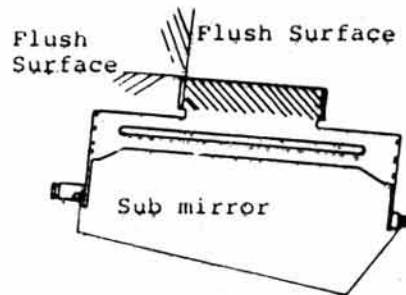
Adjustment Notes

2.3. Main Mirror Positioning

The main mirror must be positioned exactly. This requires special tools. The mirror unit only will be stocked until further notice.

2.4. Sub Mirror Positioning

Attach the mirror flush with the edges shown with double-stick tape.



2.5. Mirror Angle Adjustment

	X Axis	Y Axis
Main Mirror	0+-3'	0+-8'
Sub Mirror	0+-3'	0+-8'
	(Vert.)	(Horiz.)

2.6. Maximum Aperture Pin Height

The height of the maximum aperture signal pin should be

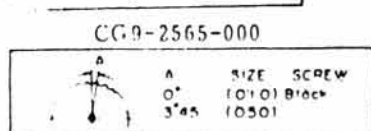
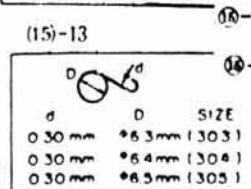
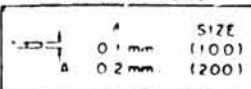
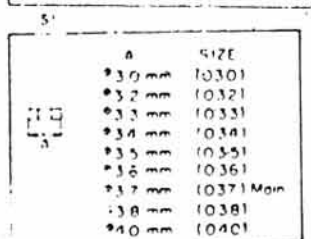
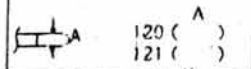
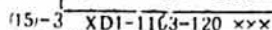
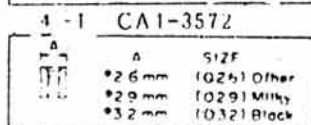
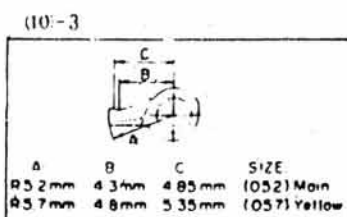
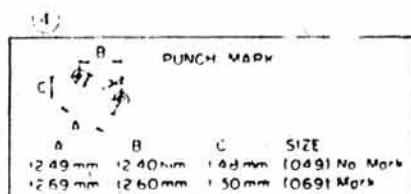
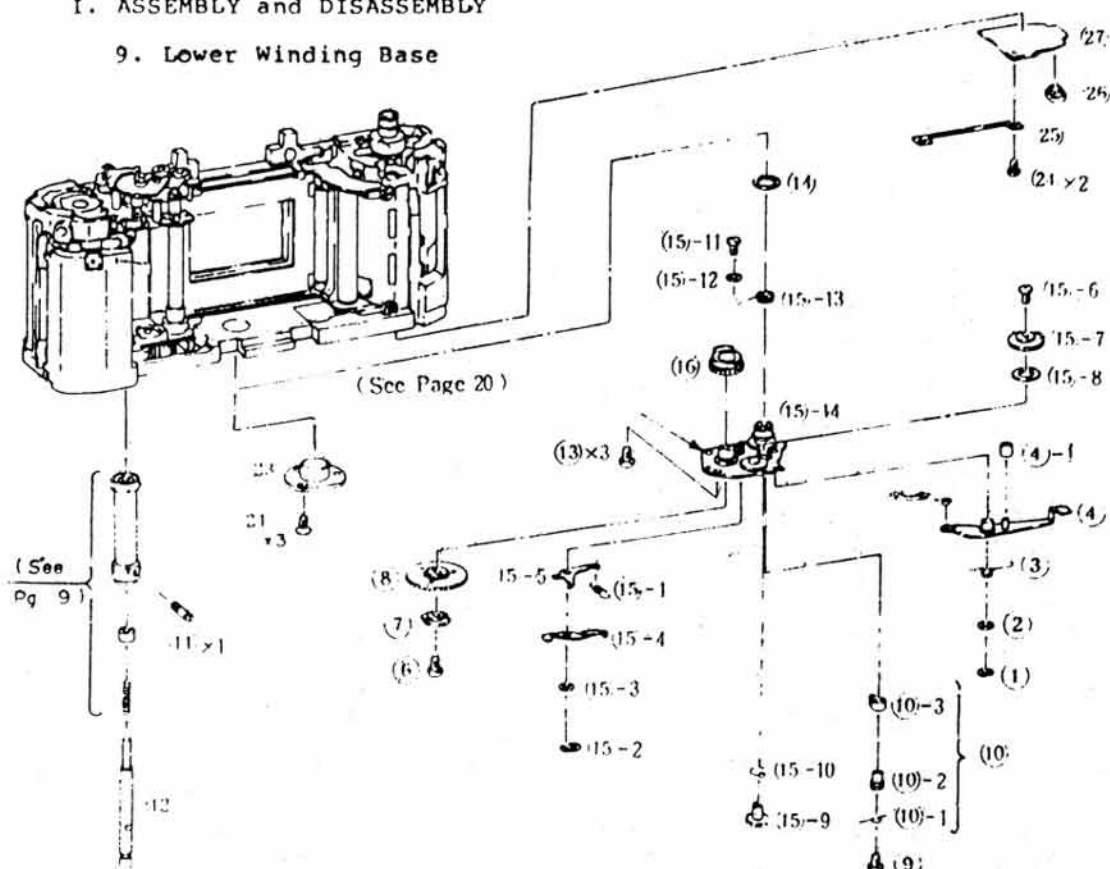
+0.05
- 6.9-0.2 mm from the mount surface.

Adjustment Tolerances (See parts catalog
for adjusting sizes)

1. (7) is used to adjust main mirror play and action.

I. ASSEMBLY and DISASSEMBLY

9. Lower Winding Base



Numbers (1) ~ (15)

21) ~ 27)

②~⑦ normal need not
be removed.

⑩-11 ~ ⑩-13 can be removed without removing ⑩-1 ~ ⑩-10

④-6 ~ ④-10 can be removed without
removing ④-1 ~ ④-5

I. ASSEMBLY and DISASSEMBLY

9. Lower Winding Base

Assembly and Disassembly Notes

1. These parts can be removed without removing either the top cover or front panel parts.
2. It is not normally necessary to remove (22)-(27).
3. (15)-6 - 10 and (15)-11 - 13 may be removed without regard to (15)-1 - 6, and (15)-1 - 10 respectively

Adjustment Notes

1. See section II.4.2. for lower winding base adjustments.
2. Match charge cams [p/q(8)] and connecting lever (4) according to the amount of mutual friction surface between them. At least 1/2 of the charge collar (5) should be in contact with the charge cam. If not use washer (3) to increase the overlap.

Adjustment Tolerances (See parts catalog for adjusting sizes)

1. If an oversize (3.8mm or larger) is used when adjusting overcharge, (See section II.4.5.), use the 049 size connecting lever. If the standard (3.7mm) or smaller collar is used use the 065 size lever. (This is to prevent backlash.

2. (4)-1 is used to prevent friction between the 2nd curtain latch and connecting lever during winding. There should be 0.2mm between them.

With the shutter wound, there should be space between the 2nd curtain charge spring and the lever collar (4)-1.

3. Collar (5) is for overcharge adjustment (See section II.4.5.). A 0.2mm change in collar diameter results in a change of 0.32mm in the overcharge.

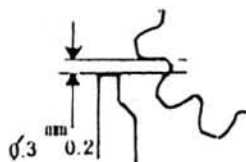
4. Charge Gear (7) affects the film perforation position. (See section II.4.1) Note: Black screws indicate the 010 size gear.

5. Pawl (10)-3 is used to prevent backlash. Use the size which gives the correct distance between the gear and pawl.

Wind and hold at the fully wound position.

The pawl should not reach next tooth.

Check the charge cam at all three positions.



Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

9. Lower Winding Base (cont.)

Assembly and Disassembly Notes

6. Use the washer (15)-8 which gives the smoothest operation of gear (15)-7. Standard: $t=0.2\text{mm}$

7. Spring (15)-13 is used to adjust the anti-backlash torque.
Check: Measure the torque at the circumference of gear (15)-7

Standard:

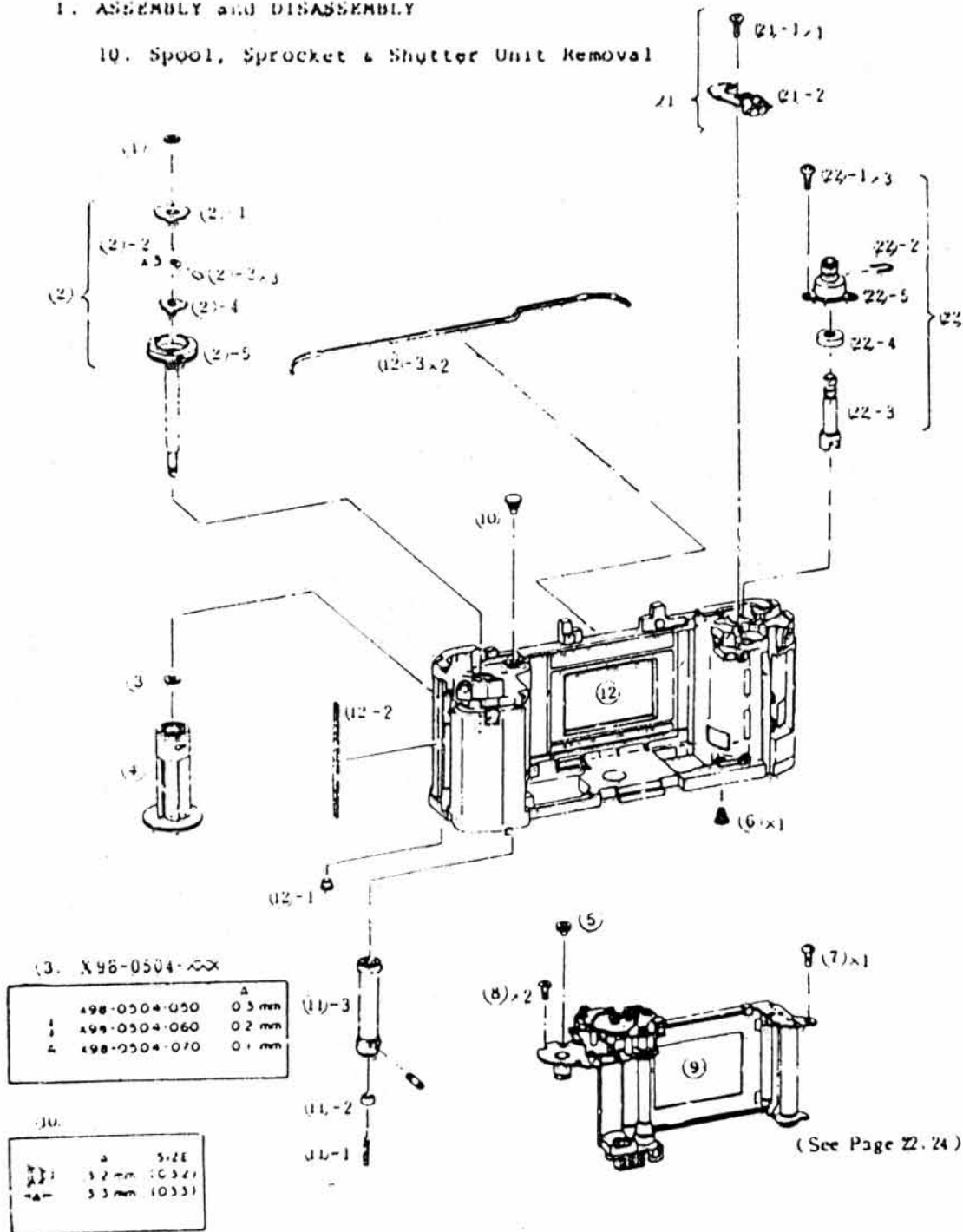
Forward : 25 - 45 g

Reverse : 80 - 130g

8. Washer (15)-3 is used to achieve the best amount of play between (15)-4 and (15)-5.

1. ASSEMBLY and DISASSEMBLY

10. Spool, Sprocket & Shutter Unit Removal



Numbers (1)~(10)

can be removed after removing 1 - 6
in Sections I.1 and I.5.

can be removed after removing 1 - 6
in Sections I.1, I.4 and I.5.

I. ASSEMBLY and DISASSEMBLY

10. Spool, Sprocket & Shutter Unit Removal

Assembly and Disassembly Notes

1. A special tool is available for removing (10). See the tools list.

Adjustment Notes

1. Winding Shaft (2)
DO NOT lubricate (2)-2, 3, 4 or the inside of (2)-5. This clutch does not require grease.
2. Be careful not to strip the threads of sprocket spindle (10) when tightening it.
3. Spool Torque
Standard: 110 - 250 gcm (Spool Diameter : 13mm)

Adjustment: Change Spool Gear Unit (15) in section I - 9.

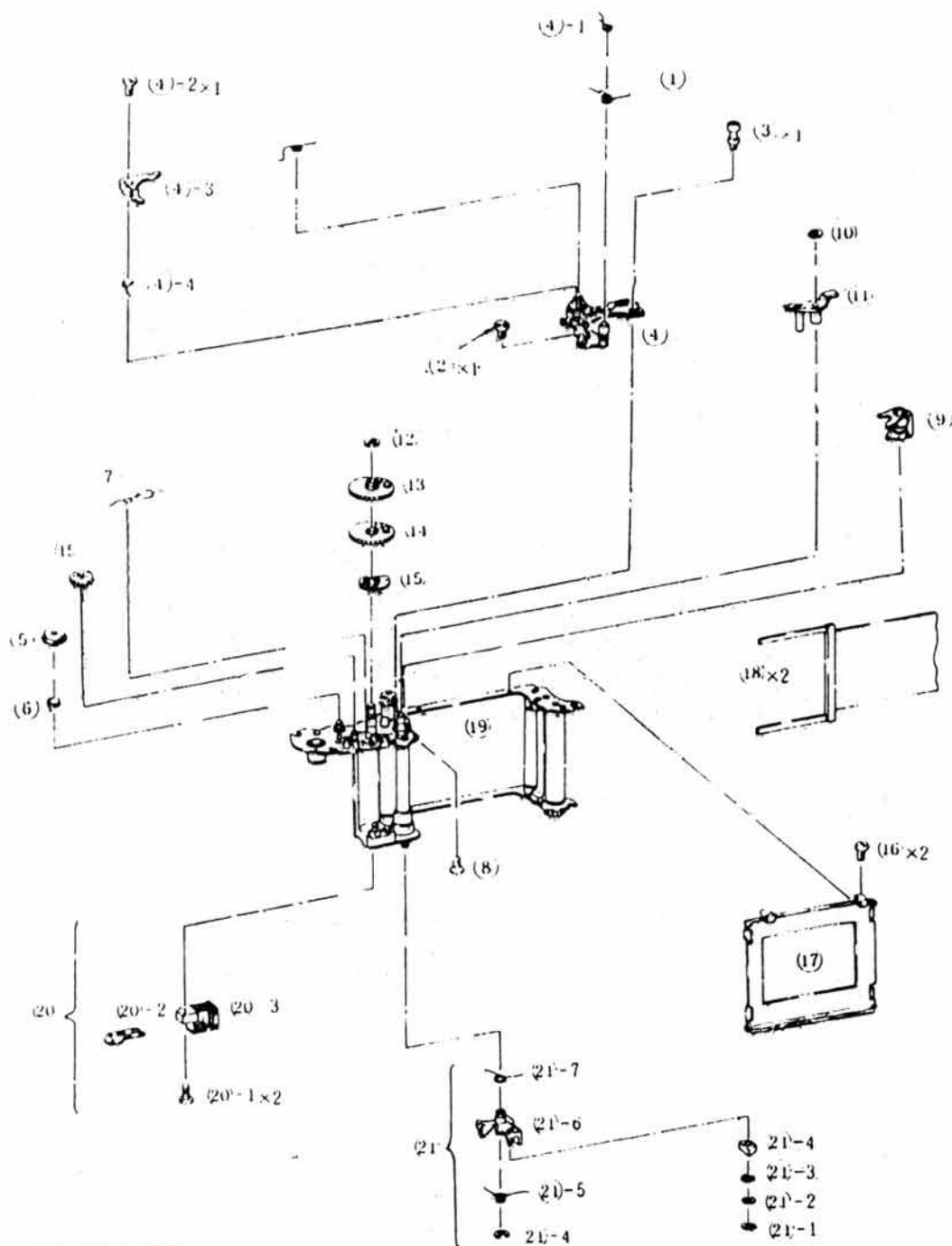
Adjustment Tolerances (See parts catalog for adjusting sizes)

1. Washer (3) is used to adjust spool end-play.
Tolerance limit: 0.15-0.4mm
2. Sprocket spindle (10) is used to adjust sprocket end-play.
Tolerance limit: 0.1-0.4mm
Spindle standard size : 032

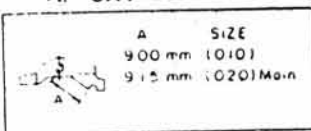
Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

11. Shutter Unit Disassembly (Part 1)



AL CA1-1636



Numbers (1) ~ (21)

11. Shutter Unit (Part 1)

Adjustment Notes

1. Shutter Curtains

Because of the increased use of plastic (pinion gear etc.) the best method for installing shutter curtains is different than older conventional shutters.

1.1. Second Curtain(Order: 1. ribbons , 2. curtain end)

1. Make sure the curtain is parallel with the aperture at both ends and the center and attach the ribbons.

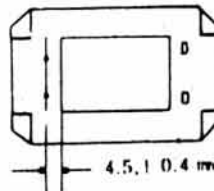
2. Attach the curtain end following the same precautions.

3. Adjust the position of the curtain bar with the pinion gear mesh.

4. After adjustment, stake the pinion gear with Aron-tite.

5. Tension the spring drum.

Adjust the final position of the curtain bar to 4.7 ± 0.4 mm from the body aperture edge. Measured on light shield (17), the distance is 4.5 ± 0.4 mm and there are punch marks at the 4.5 mm position.



1.2. First Curtain (Order: 1. curtain end, 2. ribbons)

1. Check that the curtain bar is parallel with the aperture and the 2nd curtain bar and attach the curtain end.

2. Attach the ribbons, making sure everything is kept parallel.

3. Adjust the 1st and 2nd curtain overlap with the pinion gear mesh. Overlap should be 1.5 to 3.0 at both edges and the middle of the aperture. (At the end of travel, the overlap 3.5mm).

4. After adjustment, stake the pinion gear with Aron-tite.

5. Tension the spring drum.

2. Second Curtain Magnet

See section II.4.4. for holding power check.

3. SW4 (7)

Use only fronsolve or alcohol type cleaners.

SW4 OFF position: SW4 must turn off just as the master gear starts to turn when the first curtain is released.

Standard: 1st Curtain release must take place at SW4 OFF ± 0.1 mm. This adjustment helps insure even exposure.

Reason: The 1st curtain start lever has a governor to slow the start of the 1st curtain release lever.

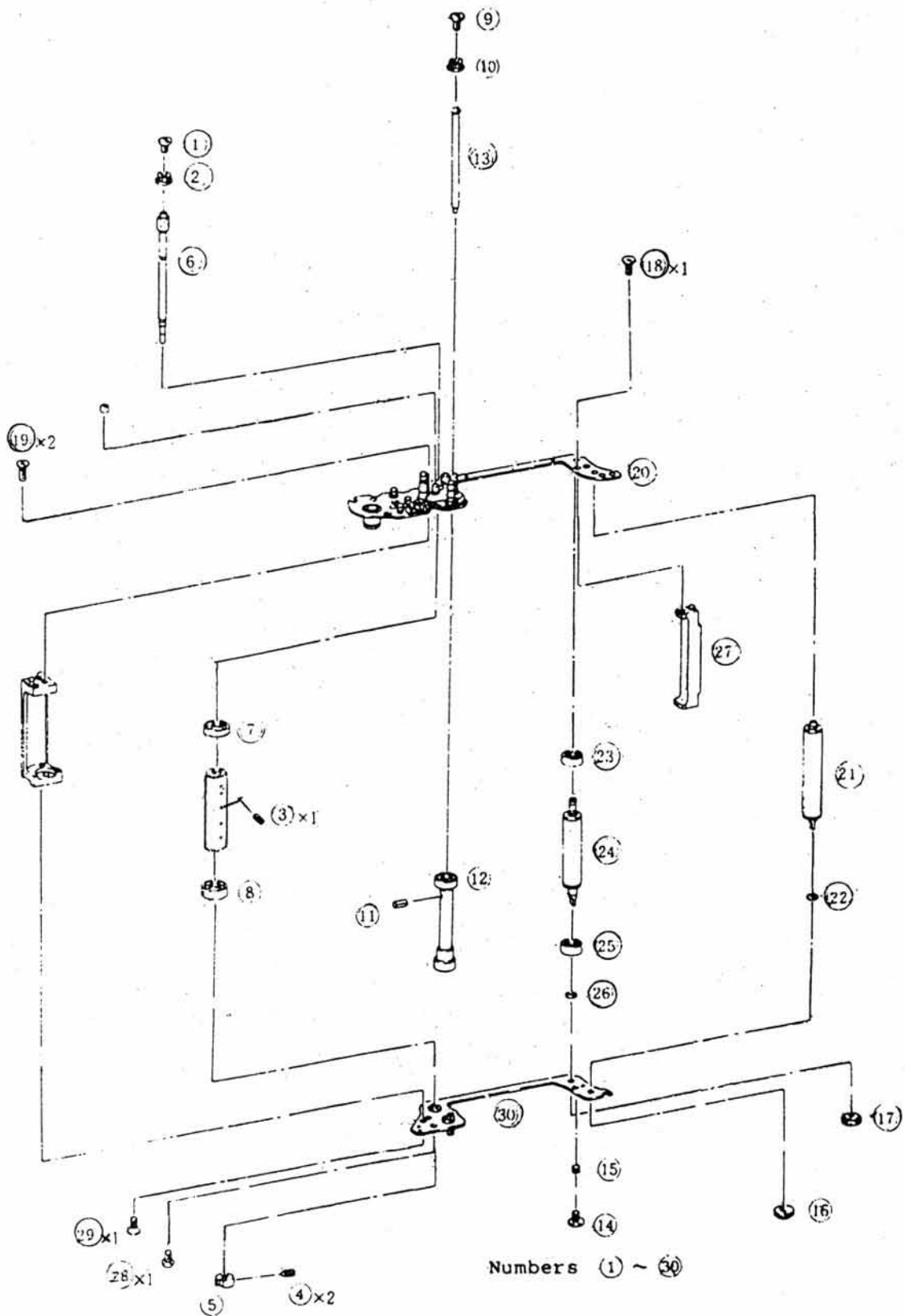
Adjustment Tolerances (See parts catalog for adjusting sizes)

1. 1st Curtain latch lever (11) is used to adjust the shutter unit overcharge. Tolerance limit: $0.4 - 0.8$ mm Standard size: 020

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

I. ASSEMBLY and DISASSEMBLY

12. Shutter Unit Disassembly (Part 2)



1. ASSEMBLY and DISASSEMBLY

12. Shutter Unit (Part 2)

Adjustment Notes

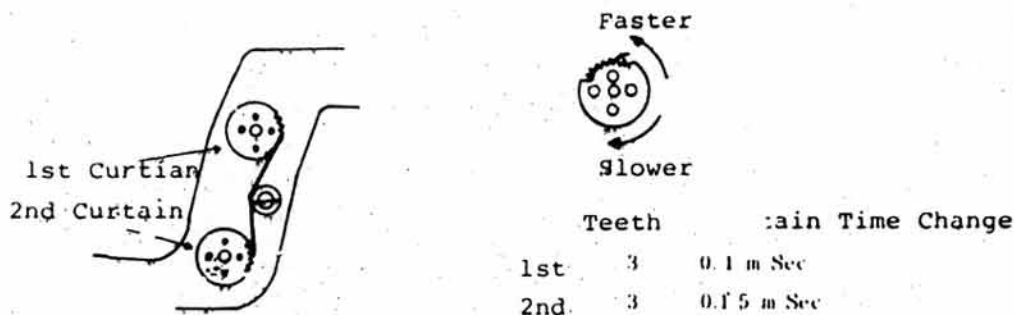
1. Curtain latch cam (5) must be adjusted. (See section 11.4.3.)

Note: Numbers in parentheses in the text correspond to circled numbers on the facing page. Disassemble in normal order and reassemble in reverse order.

1. Shutter Adjustments

1.1. Curtain Travel Time

1. Tolerance 10.5 \pm 0.3 mS (34mm slit separation)
2. Adjustment

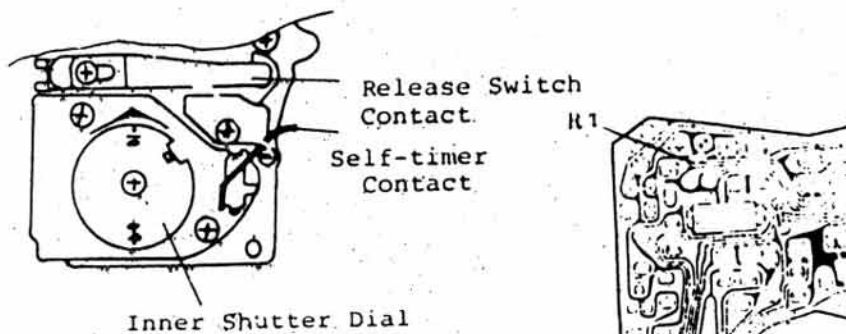


- A. Set the shutter speed to 1/1000
- B. Check the curtain travel time.
- C. Only "normal unevenness" is allowed.
("Normal" unevenness means that the 1st curtain is faster than the 2nd curtain)

1.2. Shutter Speeds

1. Tolerance limit: at 1/1000 : 1.1 mS (0.8 1.4 mS)
2. Adjustment.

Set the shutter dial to the manual 1/1000 position. (With the top cover removed, set the $\phi 10$ to the index as shown below.)



Install a 200 KOhm variable resistor in place of the existing RTC and adjust until the speed is within tolerance with 3V applied. Remove and measure the variable and install the nearest fixed resistor.

(If a variable resistor is not available, change fixed resistors until the correct value is found. A 1 Kohm increase in resistance slows the shutter speed about 0.1mS).

II. ADJUSTMENTS

2. AE Adjustments

2.1. Offset

(Only necessary if IC 1 is replaced)

1. Desolder one end of resistor RTC.

2. Short pin IC1p9 (MOS IN) to IC1p10 (TP).

3. Measure the voltage from pin 10 (TP) to ground. Record as V1.

4. Measure the voltage from pin 11 (MOS OUT) to ground. Record as V2.

5. If $V1 - V2 = 0$ to 5mV, adjustment is not necessary. Remove the short and re-coat IC1's pins with Peligon F.

6. If the voltage is not correct proceed with the adjustment.

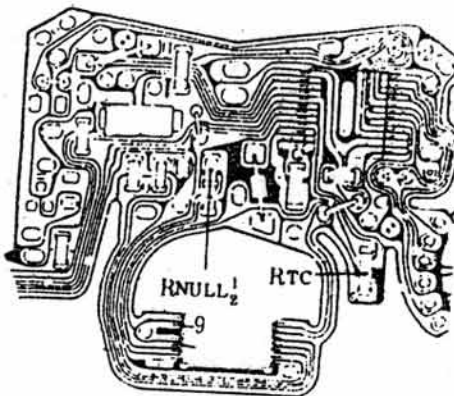
7. Remove R NULL ADJ resistor connected to either R NULL 1 or R NULL 2 and install a 200 KOhm variable at the R NULL 2 pad.

8. Adjust the variable until V1 and V2 are within limits. Disconnect and measure the variable

9. Install the nearest possible fixed resistor.

10. Recheck the voltage after installing the new resistor.

11. After the adjustment is finished. remove the short, resolder the RTC resistor and re-coat the IC pins with Peligon F.



2.2. Reference Voltage (Vc)

The reference voltage (Vc) is used as the base for all following AE adjustments. Check it carefully.

1. Reference Voltage (Vc) : 1.300 70mV

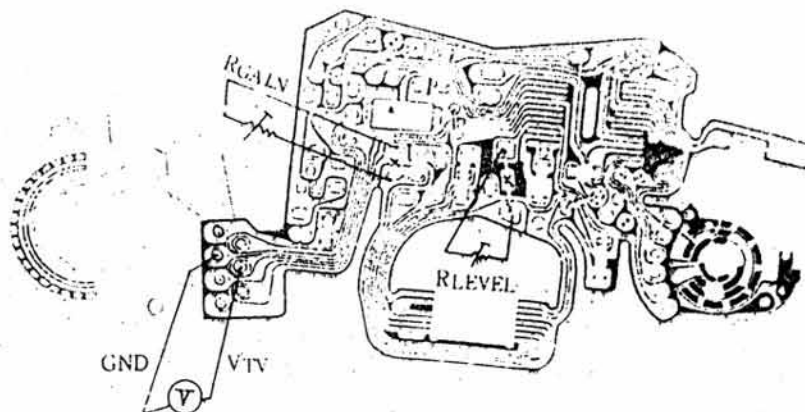
2. Check

A. Apply 3V power to the camera.

B. Measure the voltage from Vc1 to Gnd at IC2 with SW1 on. Record as reference voltage for the following adjustments.

11. ADJUSTMENTS

2. AE Adjustments



2.3. Gain

This adjustment is to correct AV (delta AV) slope to minimize variations between the various EV levels.

1. Standard: Difference between EV9 and EV15 : 6EV \pm 0.2V.

2. Adjustment

- A. Remove R Gain resistor and install a 200 KOhm variable.
- B. Adjust the light source to EV 15 (K=12.5, 4096 nt)
- C. Put the service standard lens (AE Evaluation lens if available) on the camera and set the aperture to f/5.6, and the shutter dial to "A". (Use the test top cover*).
- D. Turn SW1 on.
- E. Calibrate the correct gain voltage as follows:

$$\frac{V_C}{8} \times 6 = V \text{ Gain}$$

- F. Measure the voltage at V TV with a DDM (V_F).
- G. Set the light source to EV9 and repeat the process (V_G).
- H. $(V_F) - (V_G) - \frac{V_C}{8} = 0 \pm 10\text{mV}$
- I. Adjust the variable to meet the above conditions. Disconnect and measure the variable
- J. Install the nearest possible fixed resistor.

II. ADJUSTMENTS

2. AE Adjustments

2.4 Level

Adjust to correspond to AV level.

1. Standard: $\pm 0.3\text{EV}$

2. Adjustment

A. Adjust the light source to EV 12 ($K=12.5$, 512 nt) and camera and lens as in the previous adjustment.

B. Turn SW 1 on.

C. Calculate the level voltage (TV).

$$TV = \frac{11.7 Vc}{8}$$

D. Measure the TV voltage at the point shown on the preceeding page. It should be the same as the calculated value.

Note: Unless otherwise noted all measurements are to body ground. Only marked points should be used because parts of the body are plastic.

E. If the voltage is not correct remove the fixed resistor and use a variable to find the necessary resistance.

2.5. Meter Needle

1. Standard and tolerance limit:



0.1 EV

2. Adjustment

A. Adjust the light source to EV 9 ($K=12.5$, 64 nt) with the service standard lens (AE Evaluation lens if available) on the camera and set the aperture to $f/4.0$, and the shutter dial to "A".

B. Turn SW1 on.

C. Adjust the needle so that it cuts the center of the "3" in "30" on the shutter speed scale.

II. ADJUSTMENTS

2. AE Adjustments

2.6 Meter Deflection Angle

The meter deflection angle is adjusted so that it is within the given tolerance limit at EV15 (1/1000, f/5.6) and EV9 (1/15, f/5.6).

1. Standard:

EV15: 1/1000 \pm 0.5EV

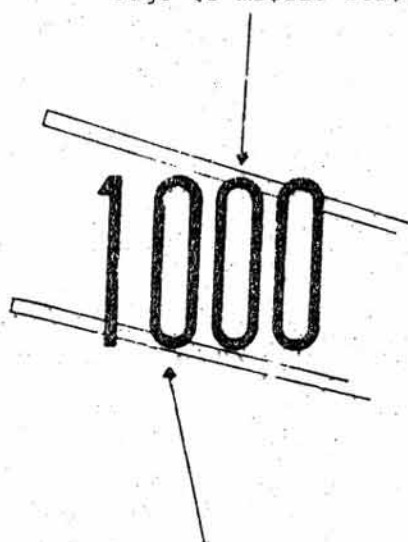
EV9 : 1/15 \pm 0.5EV

1/1000 Limits

(+0.5EV: Lower edge of needle aligned with inner edge of middle zero).

1/15 Limits

30	
15	(-0.5 E
8	(+ 0.5 EV)



(-0.5EV: Upper edge of needle aligned with inner edge of first zero).

2. Adjustment

A. Measure Vc (Section II. 2.. 2.)

$$\frac{V_c}{4.44} \times 10^4 - 293 \text{ ohms} = Y \text{ ohms}$$

B. Select the adjusting resistor closest to the "Y" value and install it in place of the current RM.

C. Recheck the meter needle position at EV9 and EV15.

11. ADJUSTMENTS

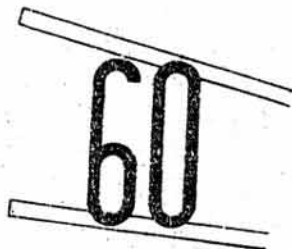
2. AE Adjustments

2.7. Flash Shutter Speed

1. Standard:

- A. The meter needle should align at $1/60 \pm 0.4\text{EV}$ when the camera is in the electronic flash mode.

-0.4EV limit: Needle aligned with inner edge of zero.

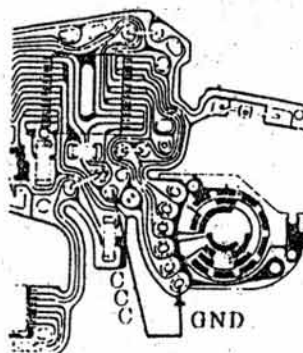


+0.4EV limit: Needle aligned with inner edge of six.

B. Tmelag (Shutter tester)

A Line: 0.5 mS or over

B Line: 1.5 mS or over



2. Check and adjustment

- A. Set the shutter dial to $1/60$
- B. Ground the CCC pad of the circuit. The needle should point to $1/60$.
- C. If it does not recheck the previous meter adjustments.
- D. Adjust the timelag by changing X contact spacing.

2.8. Battery Checker

1. Standard: With $2 \pm 0.1\text{V}$ input, the needle should be centered on the "J" in "30". (See drawing in "Meter Needle Adjustment")

II. ADJUSTMENTS

2. AE Adjustments

2. Adjustment

A. Connect the regulated low voltage power supply (LVPS) to the camera and set it to minimum output.

B. While pushing the checker button, gradually increase the voltage until the needle bisects the "3" in "30".

C. Read the voltage.

If it is greater than 2.1V, install the next lower RCH.

If it is less than 1.9V, install the next higher RCH.

D. Recheck meter deflection at EV15 and FV9.

If it fails to reach +0.5EV limit, install the next larger RM.

If it exceeds the -0.5EV limit, install the next smaller RM.

F. Recheck the battery checker.

2.9. Current Consumption

1. Leak current

A. Standard: Under 30 μ A

B. Check

Connect The LVPS to the camera and read the meter.

2. Operational Current

A. Standard: Under 250mA

B. Check

1. Connect the LVPS and an ammeter to the camera.

2. Focus on the test chart so the green LED is light(50/1.4).

3. Read the ammeter.

4. Set the shutter dial at "B" and wind the shutter.

5. Press and hold the shutter button.

6. Read the ammeter.

II. ADJUSTMENTS

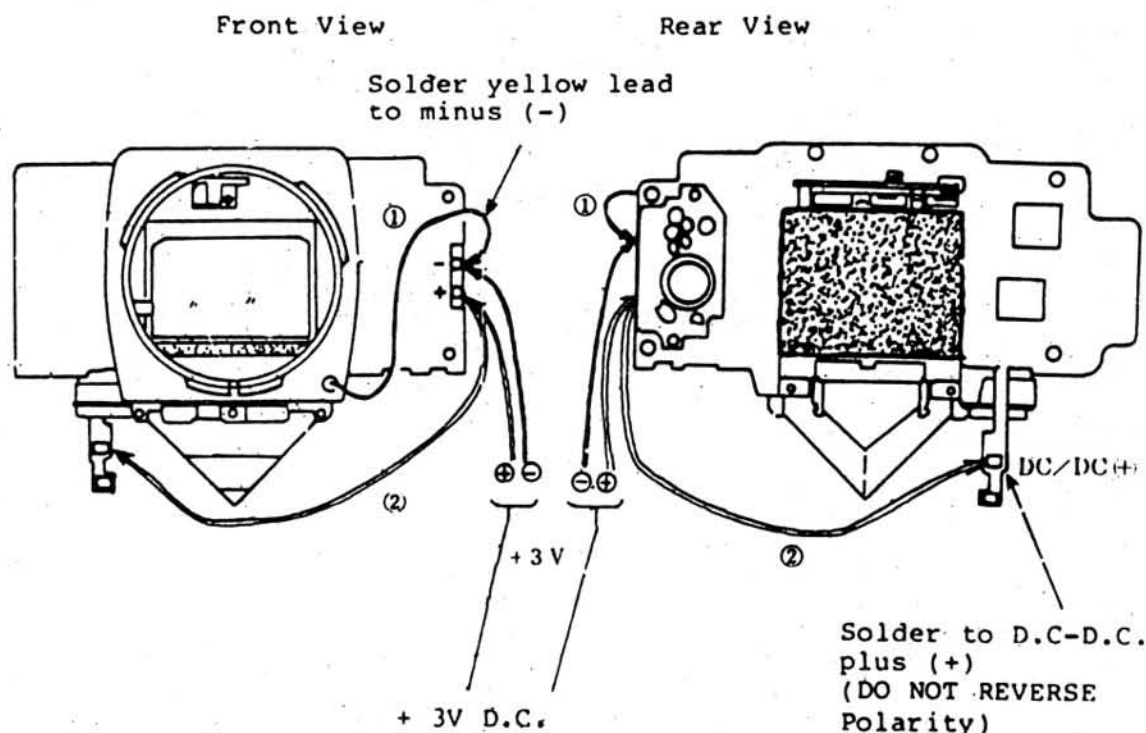
3. QF Adjustments

3.1 Preparations for Electronic Focus (QF) Adjustments

1. Camera Setting

(All electronic focus adjustments are made to the front panel unit attached to the QF Test Adaptor (CY9-1050-000). The front panel mounts in the adaptor upside-down.

1.1



Connect the yellow lead to minus (-) and the orange cord from the plus (+) to the plus (+) contact on the tongue which connects to the AC flex. Connect +3VDC to the front panel connection.

CAUTION:

Do not reverse polarity. If power is applied with the plus and minus leads reversed, the D.C.-D.C. convertor capacitor will explode. Always check polarity before applying power.

1.2. Cover the film aperture with black plastic foam, and make a black flap to cover the entire rear of the front panel.

3. QF Adjustments

1.3. Oscilloscope Connections

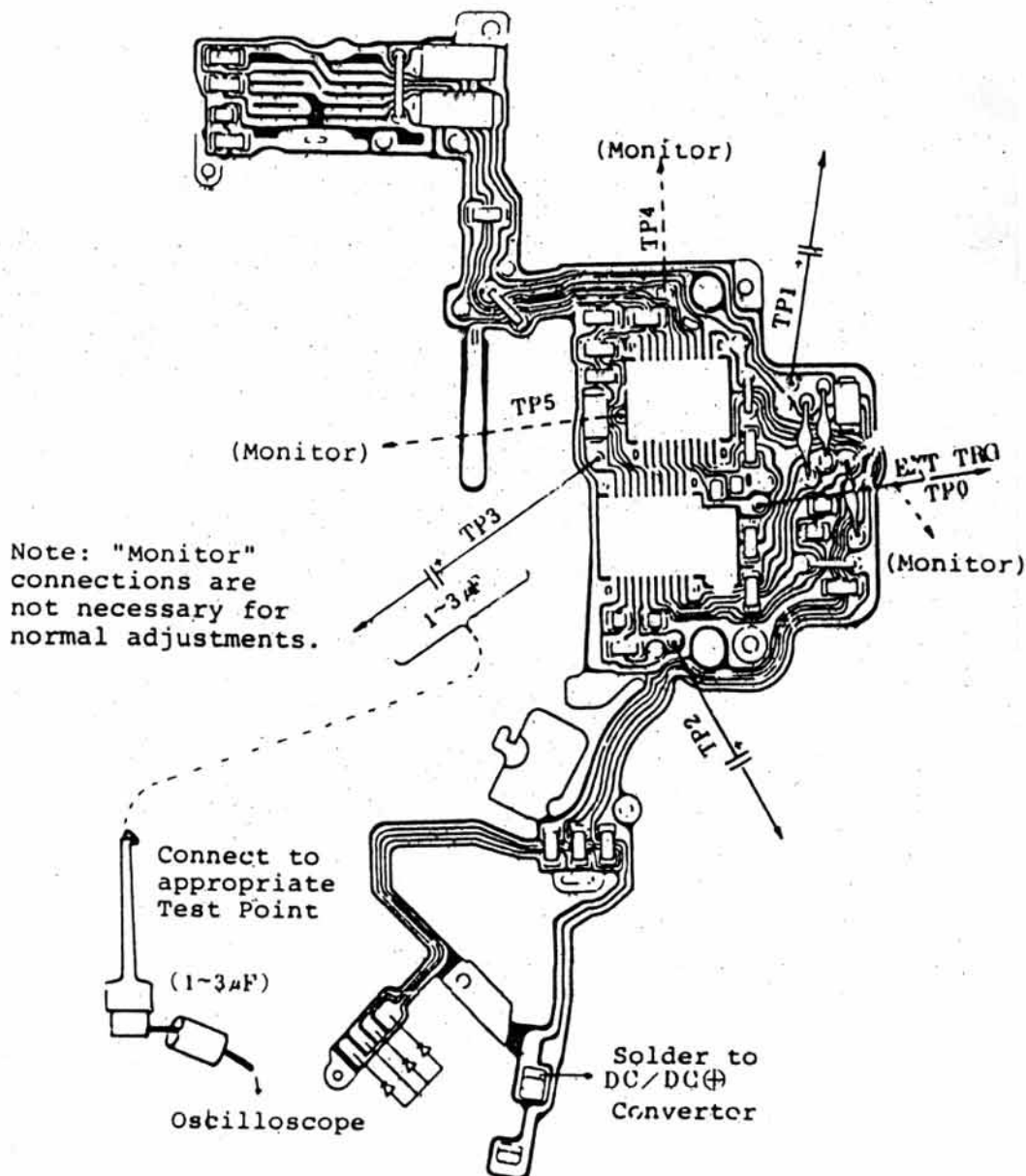
It is advisable to solder leads to the IF (focusing) flex prior to making adjustments

Oscilloscope :

Trigger: EXTERNAL - Connect to TP0

Probe : 1:1 with 1 to 3 μF capacitor*

*To see the signals at TP1, 2, and 3 a coupling capacitor (1 to 3 μF) is necessary. Because of the capacitor, it is necessary to wait 30 sec. to 1 minute (Discharge time).



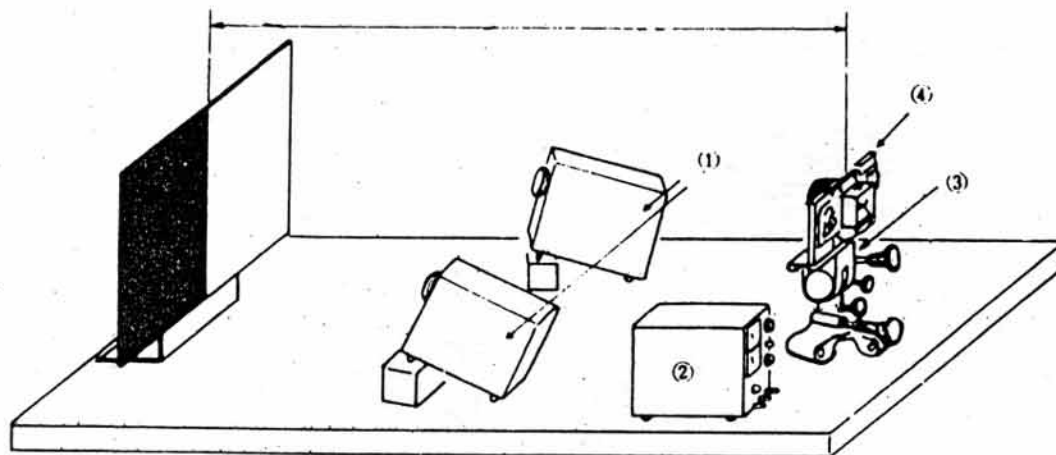
3. QF Adjustments

1.4. Test Set-ups

There are two possible test set-ups possible to adjust the QF mechanism, one using test charts at a finite distance and one using a collimator with charts optically at infinity.

1. Finite Distance Set-up

Chart to Front Panel
1.97m \pm 10mm



A. Light Sources (1)

Light source(s) which can provide a constant, consistent, illumination even over the central 20cm of the chart is necessary. We have found that modified 35mm manual slide projectors are best, and that two projectors give much more even illumination than a single unit. If a single unit is used, it should be located as close as possible to the optical axis as possible to avoid uneven illumination.

A.C. flicker makes adjustment very difficult. Each projector should be modified to take a D.C. 12V, 24W bulb. The fan should remain connected to the A.C. power supply.

B. D.C. Power Supply (2)

Use a power supply capability of powering the light source lamp(s).

C. After making the connections, mount the front panel in the QF Adjustment Stand (CY9-1050-000). 1)

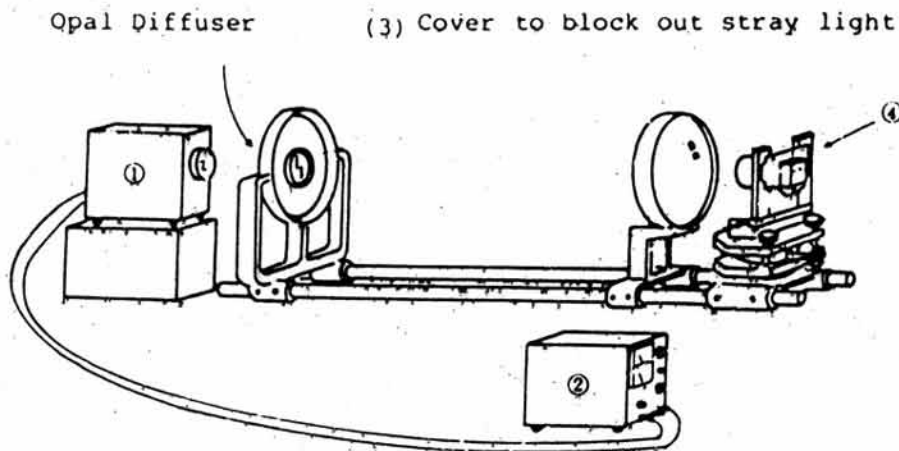
D. Tripod Pan Head (3)

A large, smooth tripod pan head is recommended. If not available, a stand which allows small angular movements is recommended.

II. ADJUSTMENTS

3. QF Adjustments

2. Oscilloscope Set-up



A. Modified Projector (1)

Use modified projector as explained in finit distance set-up

Plase a diffuser between projector lamp and co.,limator chart.

Light the chart evenly with an illumination of about EV9.

B. D.C. Power Supply (2)

Use a power supply capability of powering the light source lamp(s).

C. After making the connections, mount the front panel in the QF Adjustment Stand (CY9-1040-000). (4)

D. Tripod Pan Head

A large, smooth tripod pan head is recommended. I not available, a stand which ailows smail angular movements is recommended.

E. Chart

The chart should be adjusted to infinity position.

II. ADJUSTMENTS

3. QF Adjustments

1.2 QF Test Standard Lens

1. Lens extension

To accurately measure the lens extension, a piece of graph paper should be taped around the lens on the focusing scale. Since the front panel is upside-down, the most convenient position is not at the normal index, so a new index is also desirable.

NEW FD 50mm 1:1.4

The lead (extension for one complete revolution) is 12.5mm or 0.03472mm per degree. This is equivalent to 0.0648mm lens extension per millimeter of revolution on the circumference of the focusing ring with 0.2mm thickness graph paper.

FD 50mm 1:1.4

The lead (extension for one complete revolution) is 12.0mm or 0.0333mm per degree. This is equivalent to 0.0590mm lens extension per millimeter of revolution on the circumference of the focusing ring with 0.2mm thickness graph paper.

2. Finite Distance (2 Meter) Lens Extension

It is necessary to establish the exact position for correct focus at 2 meters on the test standard lens if the finite distance method is used.

The calculated extension for 2 meter focus is 1.39mm, but because of variations between individual lenses, the following procedure is recommended.

- A. Select a known-good camera body (an average of several is better), and remove the front panel.
- B. Select a 50mm/1.4 lens that is accurately adjusted for infinity focus.
- C. Prepare the front panel* and lens as outlined in section (II.3.7).
- D. Adjust the lens so that $VA1 = VA3$ at TP3. Mark the extension of the lens at this point. This is the "just focus" correct 2 meter point for the test standard lens.

* just focus: For lack of a better term, the Japanese term "just focus" will be used to indicate the correct "in focus" signal or condition of the QF circuit.

II. ADJUSTMENTS

3. QF Adjustments

1.3 Typical Oscilloscope Waveforms

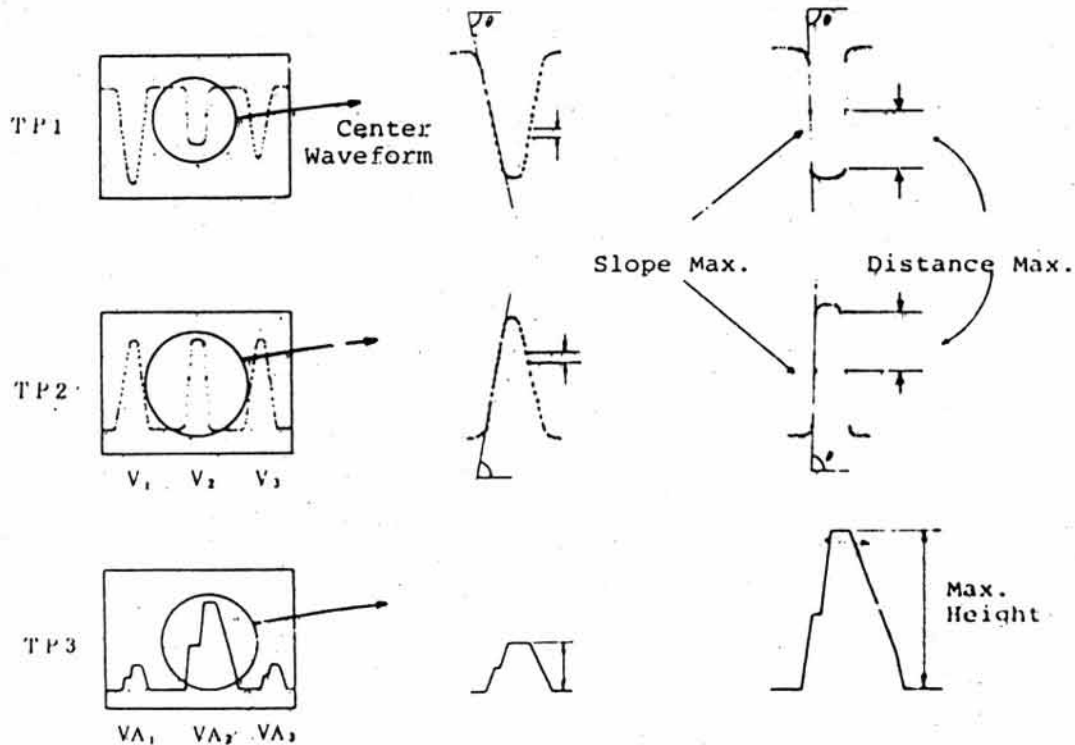
Throughout this guide references are made to maximum front, middle or rear focus. The oscilloscope waveforms for best middle (just focus) are shown below. For front focus, the waveforms on the left would be as shown and for rear focus the waveforms on the right would be as shown.

One Bar Chart



Defocus

Just Focus



II. ADJUSTMENTS

3. QF Adjustments

1.4. Post IC Replacement Adjustment Task List

When any of the IC's are changed, perform the adjustments in the order listed.

Replaced IC

Adjustment	CCD	SFP	CPU
1. Mirror Angle 45°	1	1	1
2. Parallax	2	X *	X
3. Level	3	2	X
4. Sensor Parallax	4	4	X
5. Waveform Check	5	5	3
6. QF Focus (Coarse)	6	6	X
7. QF Focus (Fine)	7	7	4
8 R 105	X	3	2

X* : Adjustments marked "X" are not necessary.

II. ADJUSTMENTS

3. QF Adjustments

3.2. Sub-mirror Adjustment

Tools: 1. Universal 90° Collimator
or 2. Simplified 90° Collimator
3. Reverse Mount
4. Spanner

Standard:

Sub-mirror : Horizontal $\pm 8'$
Vertical $\pm 6'$

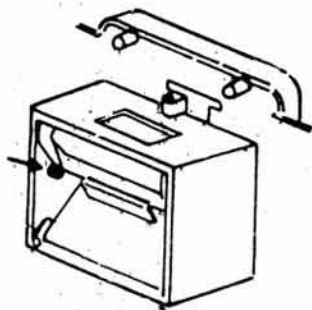
Main Mirror: Horizontal $\pm 10'$
Vertically $\pm 3'$

Adjustment : Sub-mirror eccentric

Method:

Adjust eccentric until within mirror angle is within tolerances.

Sub-mirror
eccentric

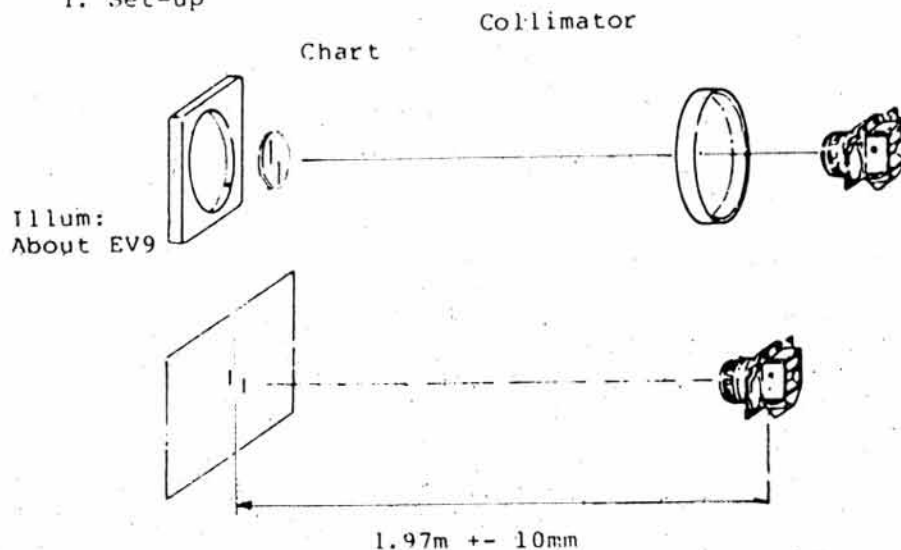


II. ADJUSTMENTS

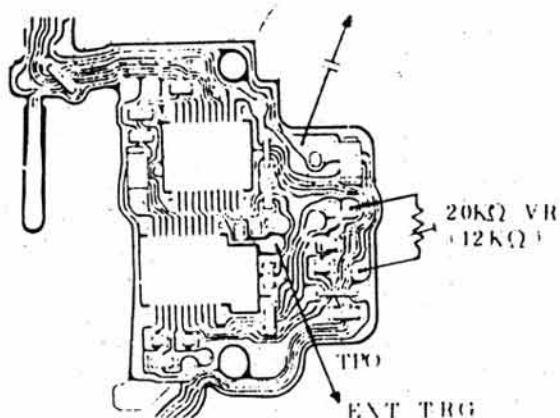
3. QF Adjustments

3.3. CCD Parallax Adjustment

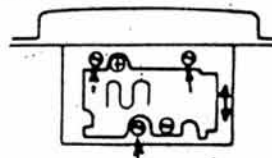
1. Set-up



2. Oscilloscope Coupling and Adjustment.



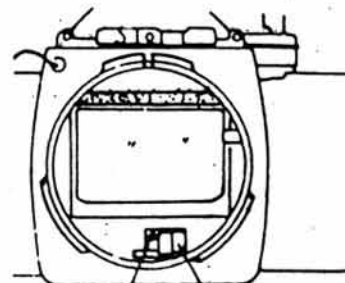
Adjustment
(with auto. diaphragm
unit removed)



Oscilloscope

Coupling : D.C.
Channel 1: 50mV/div (1:1 probe)
Time Base: 2ms/div.
Trigger: EXTERNAL(trailing edge)

Because of capacitance
coupling, wait about
30 seconds for D.C.
level to stabilize.



Sensor Positioning
Screw

remove cover
plate


II. ADJUSTMENTS

3. QF Adjustments

3.3 Parallax Adjustment

Test Equipment: Oscilloscope

Tools: 1. QF Test Standard Lens

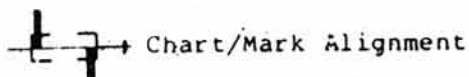
2.  Chart

3. 20 KOhm Variable Resistor (set to about 12 KOhm)
4. 1 - 3 uF film or Tantalum capacitor (on probe)

Adjustment : CCD Longitudinal Position

Method:

1. Loosen the CCD positioning screw (previous page)
2. If the IF flex is new there will be no resistors mounted at the R101, 102 and 103 positions. In this case mount the 20 KOhm variable in the R102 position. (At least one of the three must be installed to make this adjustment). Per-set the variable to about 12 KOhm.
3. Adjust the front panel position so the chart is aligned with the focus mark as shown.



4. Adjust for best middle (just focus) focus (See section II . 3 .1.3). Loosen three sensor screws and adjust the longitudinal (fore-aft) position of the sensor.
5. Adjust so that, in the oscilloscope waveform $A = B$ and tighten the screws.
6. Remove the lens and tighten the sensor positioning screw until it just touches the sensor unit.
7. Leave the 20 KOhm resistor in position. It is used in the next adjustment.

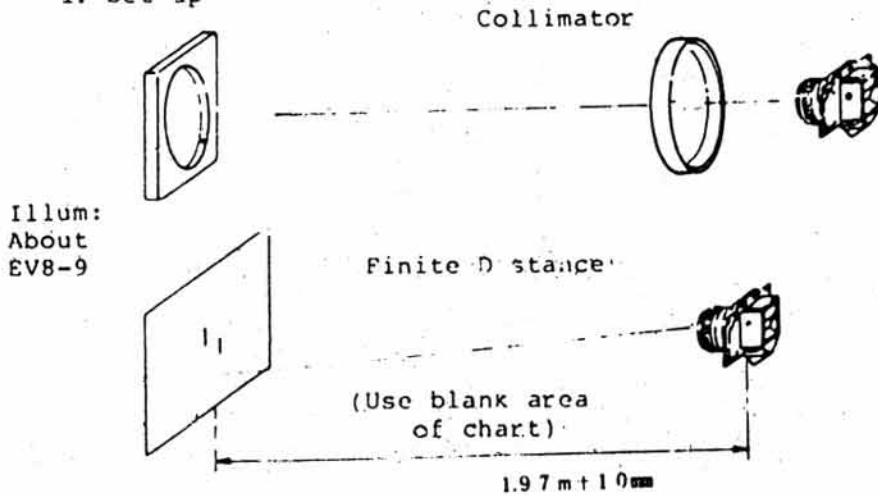


II. ADJUSTMENTS

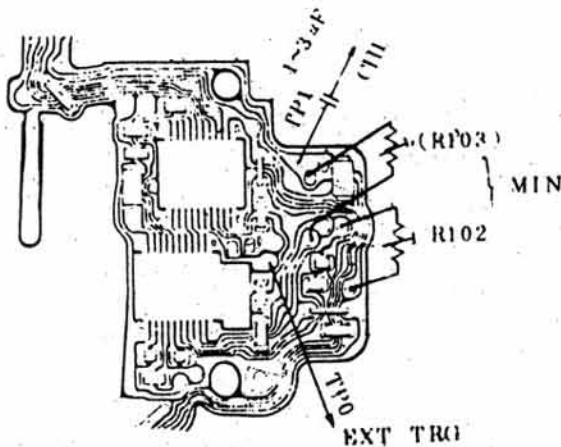
3. QF Adjustments

3.4. Gain Adjustment

1. Set-up



2. Oscilloscope Coupling and Adjustment



Oscilloscope

Coupling : D.C.

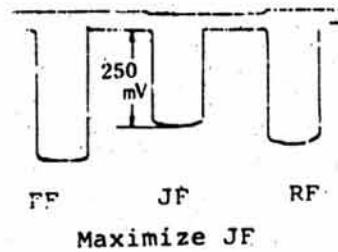
Channel 1: 50mV/div (1:1 probe)

Time Base: 2ms/div.

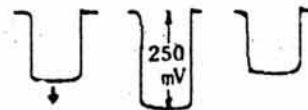
Trigger: EXTERNAL(trailing edge)

Because of capacitance coupling, wait about 30 seconds for D.C. level to stabilize.

TP1 Waveform



Increase brightness



3. QF Adjustments

3. Adjustment

Test Equipment: Oscilloscope

Tools: 1. QF Test Standard Lens

2. 20 K Ω m Variable Resistor (set to about 12 K Ω m)

3. 1 - 3 μ F film or Tantalum capacitor (on probe)

4.  Chart.

Standard:

TP1 Output: 250mV \pm 30mV

Adjustment : R102 or R108 (Minimum)

Method:

1. Mount a 20 K Ω m variable resistor adjusted to about 12 K Ω m in the R102 position.
2. Watching the waveform of TP1 adjust the variable for a minimum.
(Normally, the middle waveform will be the smallest of the three. If the rear waveform is smaller move the variable resistor to the R103 position and proceed. (There should not be a resistor in both positions).)
3. Set the illumination for about EV8 and adjust the gain at TP1 is 250mV. Then adjust the variable until TP1 decreases suddenly and sharply. (AGC Threshold)
4. At this point gradually raise the illumination level and adjust the variable so the output at TP1 is 250mV \pm 30mV.

If TP1 is greater than 250mV- Increase Resistance
If TP1 is smaller than 250mV- Decrease Resistance

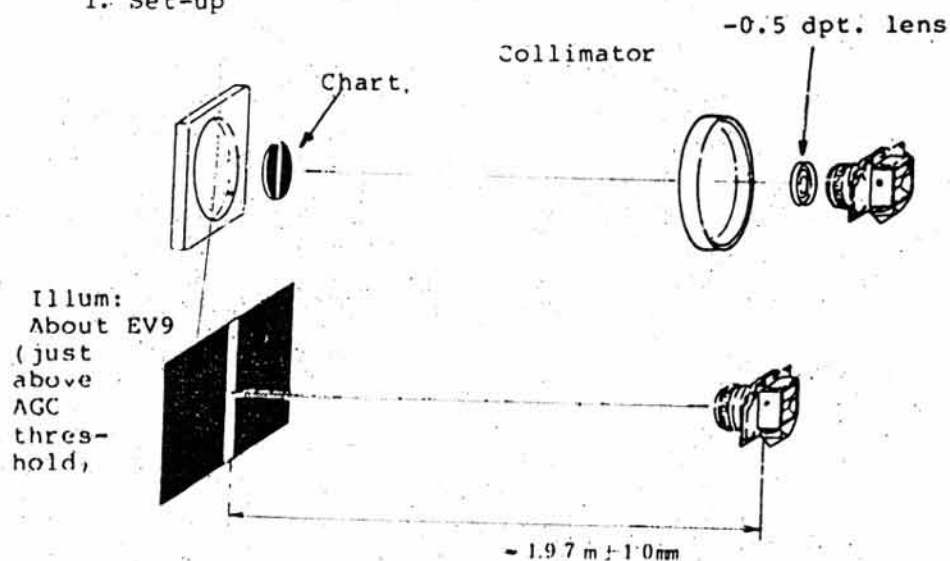
5. Install a fixed resistor of the same resistance as the variable resistor.

II. ADJUSTMENTS

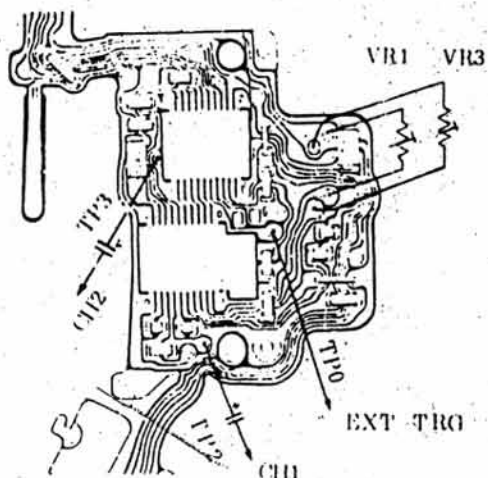
3. QF Adjustments

3.5. Sensor Balance Adjustment

1. Set-up



2. Oscilloscope Coupling and Adjustment



Oscilloscope

Coupling : D.C.

Channel 1: 100mV/div (1:1 probe)

Channel 2: 10-20mV/div

Time Base: 2ms/div.

Trigger: EXTERNAL(trailing edge)

Because of capacitance coupling, wait about 30 seconds for D.C. level to stabilize.

II. ADJUSTMENTS

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3. QF Adjustments

3. Adjustment

Test Equipment: Oscilloscope

Tools: 1. QF Test Standard Lens

2.  Chart

3. Two each 20 KOhm Variable Resistor (set to about 10 KOhm)

4. 1 - 3 uF film or Tantalum capacitor (on probe)

Standard:

Comparative height of front, middle, and rear waveforms

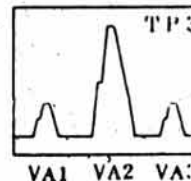
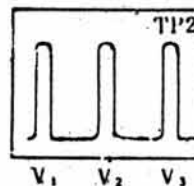
Front and Rear waves should be within 2% of the height of the middle waveform.

Adjustment : R101 , R103 (or R101, R102)
(Depends on section 3.4)

Method:

This method is written assuming the resistor selected in section 3.4 was R102. If it was R103, substitute R103 for R102.

1. Mount a 20 KOhm variable resistors adjusted to about 10 KOhm in the R101 and R103 position 3.
2. Check the waveform of TP2 on Channel 1, adjust for "just focus" and record the middle waveform voltage as V2.
3. Adjust for best front focus and adjust the variable resistor so that $V1 = V2$. Repeat the process for rear focus. (Course adjustment OK)
4. Monitoring TP3 on Channel 2, carefully adjust the lens until the VA2 signal is maximum. (If an A.C. light source is used, this adjustment is practically impossible because of instability of the waveforms).
5. Adjust the illumination just above the AGC threshold (where VA2 changes suddenly). Then adjust the oscilloscope variable gain control so VA2 is about seven divisions on the screen.
6. As in step 3, adjust for best front focus and adjust VR1 so $VA2 = VA1$. Adjust for best rear focus and repeat using VR3 until $VA3 = VA2$.
7. Remove and measure the variable resistors and replace them with fixed resistors of the same value.

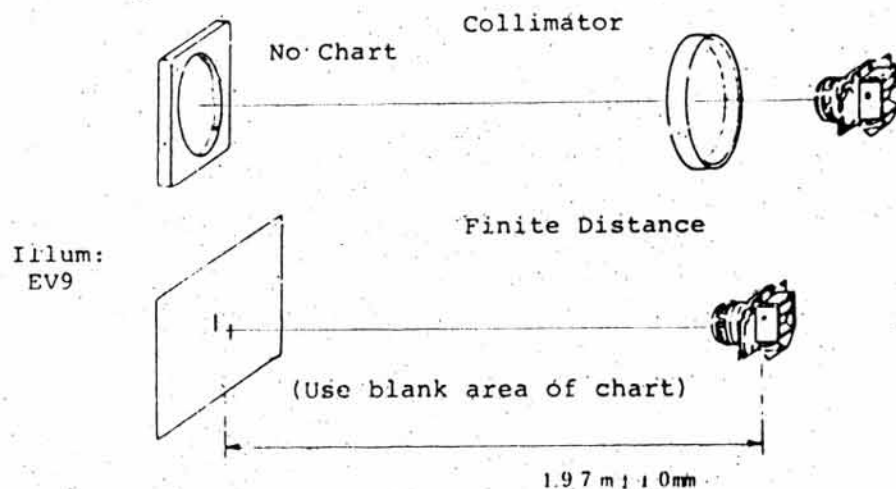


II. ADJUSTMENTS

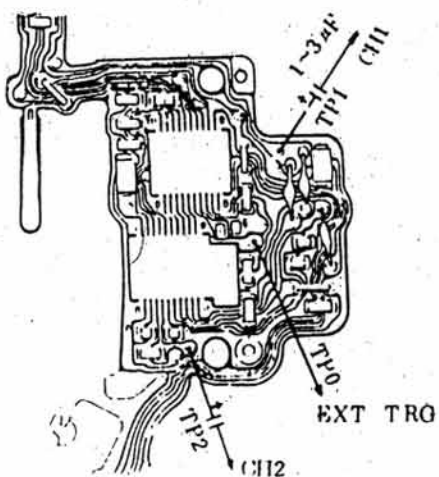
3. QF Adjustments

3.6. Waveform Checks

1. Set-up



2. Oscilloscope Coupling and Adjustment



Oscilloscope

Coupling : D.C.

Channel 1: 50mV/div (1:1 probe)

Channel 2: 0.1-0.2mV/div

Time Base: 2ms/div.

Trigger: EXTERNAL(trailing edge)

Because of capacitance
coupling, wait about
30 seconds for D.C.
level to stabilize.

II. ADJUSTMENTS

3. QF Adjustments

3. Adjustment

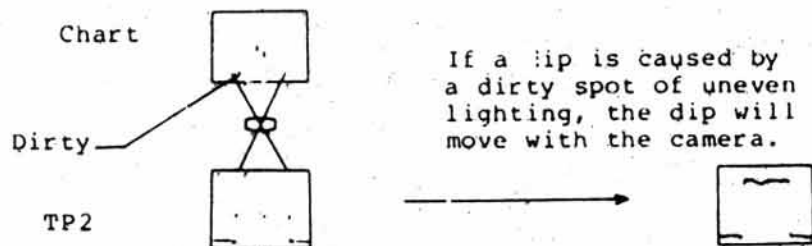
Test Equipment: Oscilloscope

Tools: 1. QF Test Standard Lens

2.  Chart.

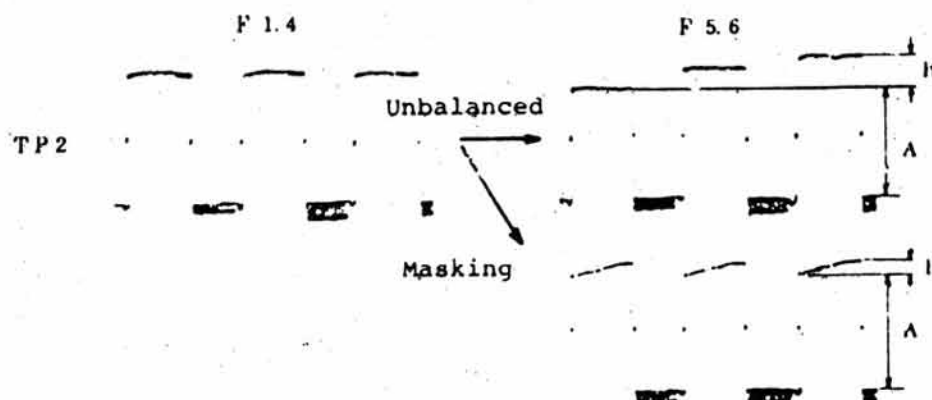
3. 1 - 3 μ F film or Tantalum capacitor (on probe)

Note: If light from any source other than through the lens strikes the CCD, the balance will appear to be bad. Also, if the chart is not evenly lit or is dirty, the CCD output will appear uneven. In either case the following checks will not be accurate.



1. Masking Check (TP 2 Signal)

Standard: When the lens is stopped down from $f/1.4$ to $f/5.6$ the balance should change no more than 7%.

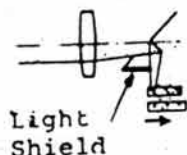


II. ADJUSTMENTS

1. QF Adjustments

If masking occurs which is very rare, proceed as follows:

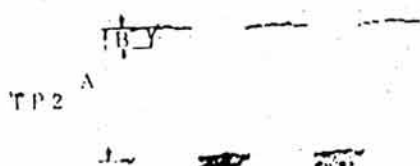
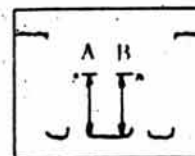
A. The main mirror light shield may cause masking. If it does, move the CCD slightly to the rear, and tighten.



B. With the same set-up as used in II.3.3 (parallax), move the camera vertically so $A=B$. At this point the focus frame should be centered on the chart.

2. Dirt, Dust and Foreign Matter Checks

A. Sharp dips in the signal waveform



Causes:

1. Foreign matter between beam splitter and CCD.

2. Foreign Matter in the CCD.

1. Loosen the two screws and remove the particles.

2. For bad cases over 7% (B/A ratio), replace the CCD.

B. Shallower, wider dips



Causes:

1. Dirty IR Filter

2. Foreign matter between IR filter and beam splitter.

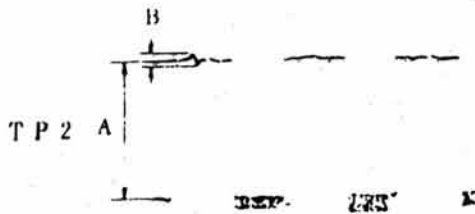
1. Clean the IR filter from within the mirror box.

2. Change the beam splitter base.

I. ADJUSTMENTS

3. QF Adjustments

3. CCD Output Level Imbalance



Cause: Inherent Imbalance
between bits, not caused
by foreign matter

Tolerance Limit : B/A 10%

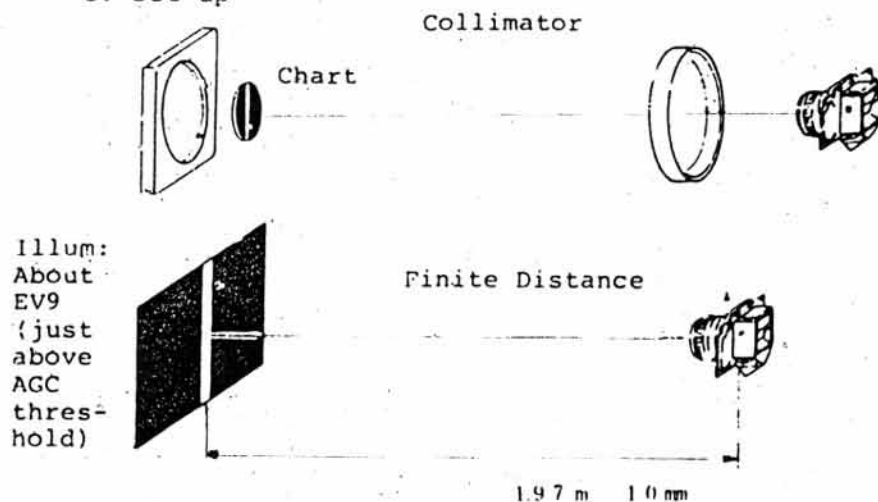
There is no cure for this problem. If the CCD is out of tolerance, change it.

Note: These types of problems do not have much effect on large aperture lenses, but can cause false signals with small aperture lenses.

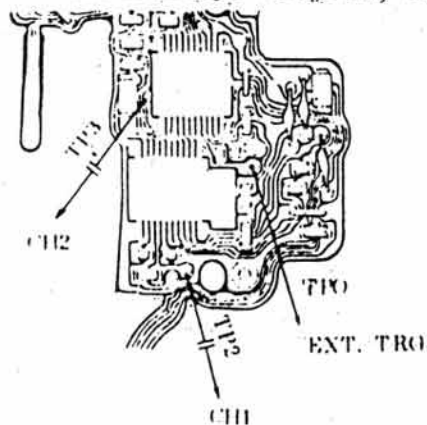
3. OF Adjustments

3.7. OF Focus Coarse Adjustment

1. Set-up



2. Oscilloscope Coupling and Adjustment



Oscilloscope

Coupling : D.C.

Channel 1: 100mV/div (1:1 probe)

Channel 2: 10-20mV/div

Time Base: 2ms/div.

Trigger: EXTERNAL(trailing edge)

Because of capacitance
coupling, wait about
30 seconds for D.C.
level to stabilize.

NEW FD 50mm 1:1.4

The lead (extension for one complete revolution) is 12.5mm or 0.03472mm per degree. This is equivalent to 0.0648mm lens extension per millimeter of revolution on the circumference of the focusing ring with 0.2mm thickness graph paper.

FD 50mm 1:1.4

The lead (extension for one complete revolution) is 12.0mm or 0.0333mm per degree. This is equivalent to 0.0590mm lens extension per millimeter of revolution on the circumference of the focusing ring with 0.2mm thickness graph paper.

II. ADJUSTMENTS

3. QF Adjustments

3. Adjustment

Test Equipment: Oscilloscope

Tools: 1. QF Test Standard Lens (with graph paper scale,
(See section II.3.1.2).

2.  Chart

3. 1 - 3 μ F film or Tantalum capacitor (on probe)

Standard:

$0 \pm 0.05\text{mm}$

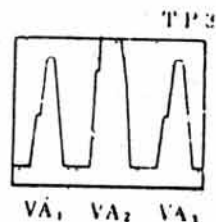
Adjustment : Adjusting Washers
(See Parts Catalog for available thicknesses)

Method:

A. Collimator Method

1. Check the waveform of TP3 on Channel 2.
Carefully adjust for "just focus" so
that $VA1 = VA3$.

Note: Adjust the oscilloscope until
 $VA1$ and $VA3$ are approximately
6 to 7 divisions on the scale.
 $VA2$ may be off scale. This
is OK.



2. Carefully measure the lens extension from infinity and
select a washer to bring the focus to within 0.05mm.
3. Loosen the three sensor mounting screws, install the washer
and retighten the screws while pressing the sensor toward
the lens mount.

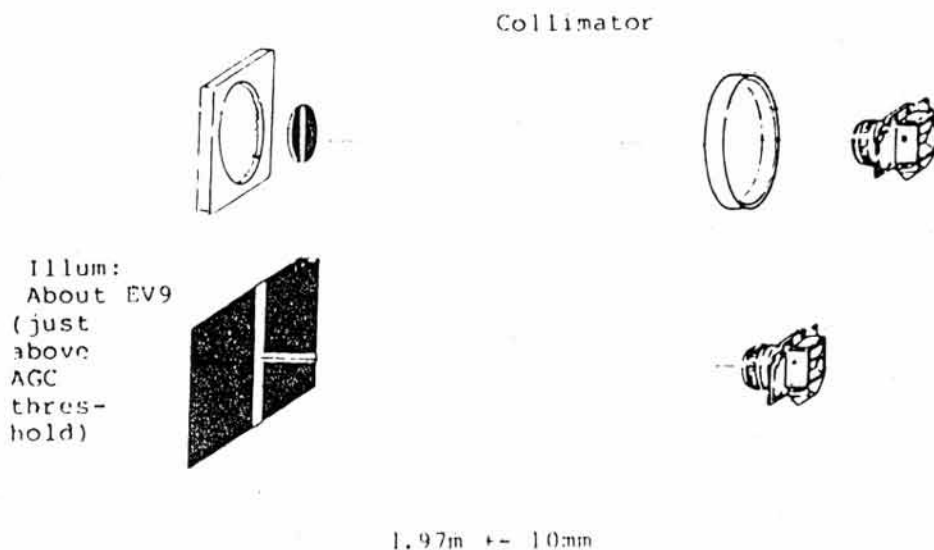
B. Finite Distance Method

1. Same as A.1 above.
2. Carefully measure the lens variation from 2 meters and
select a washer to bring the focus to within 0.05mm.
3. Loosen the three sensor mounting screws, install the washer
and retighten the screws while pressing the sensor toward
the lens mount.

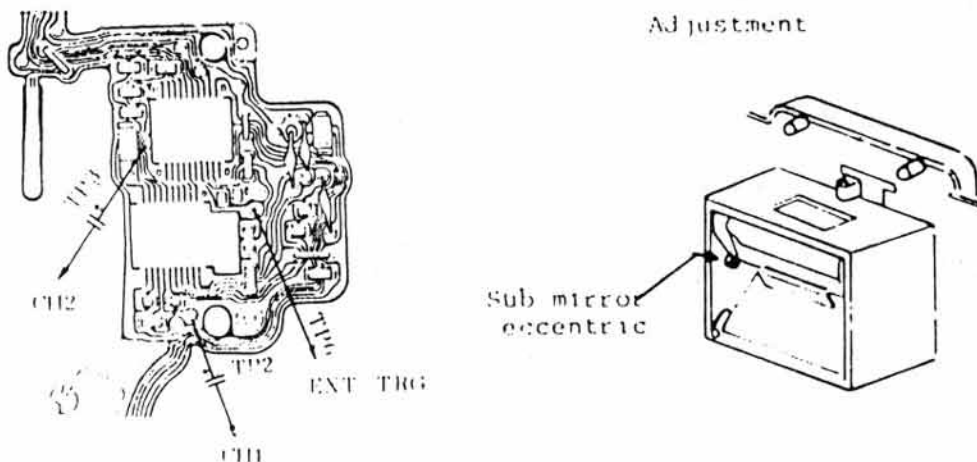
3. QF Adjustments

3.8. QF Focus Fine Adjustment

1. Set-up



2. Oscilloscope Coupling and Adjustment



Oscilloscope

Coupling : D.C.
Channel 1: 100mV/div (1:1 probe)
Channel 2: 10-20mV/div
Time Base: 2ms/div.
Trigger: EXTERNAL(trailing edge)

Because of capacitance
coupling, wait about
30 seconds for D.C.
level to stabilize.

11. ADJUSTMENTS

3. QF Adjustments

3. Adjustment

Test Equipment: Oscilloscope

Tools: 1. QF Test Standard Lens (with graph paper scale,
(See section II.3.7)).

2.  Chart

3. 1 - 3 uF film or Tantalum capacitor (on probe)

Standard:

0 \pm 0.02mm (at infinity for collimator method)
(at 2m for finite distance method)

Adjustment:

Sub-mirror eccentric

Method:

A. Collimator Method

Set the lens to infinity. Check the waveform of TP3 on Channel 2. Carefully adjust the sub-mirror eccentric so that VA1 = VA3 exactly.

B. Finite Distance Method

1. Set the lens to 2m. (See Note 1), and carefully adjust the sub mirror so that VA1 = VA3.
2. Sight on a distant, high contrast scene with the lens on infinity. Slowly move the lens off of infinity until the green just focus indicator goes out. The infinity mark should be aligned with the f/4 - f/5.6 area of the depth-of-field scale.

Caution: The QF fine focus adjustment cannot be performed unless these pre-conditions are met.

1. The sub-mirror is adjusted to $45^\circ \pm 6$.
2. The focus has been adjusted with washers (3.6.) to within 0.05mm.

If these conditions are not met, the fine adjustment will cause focusing errors.

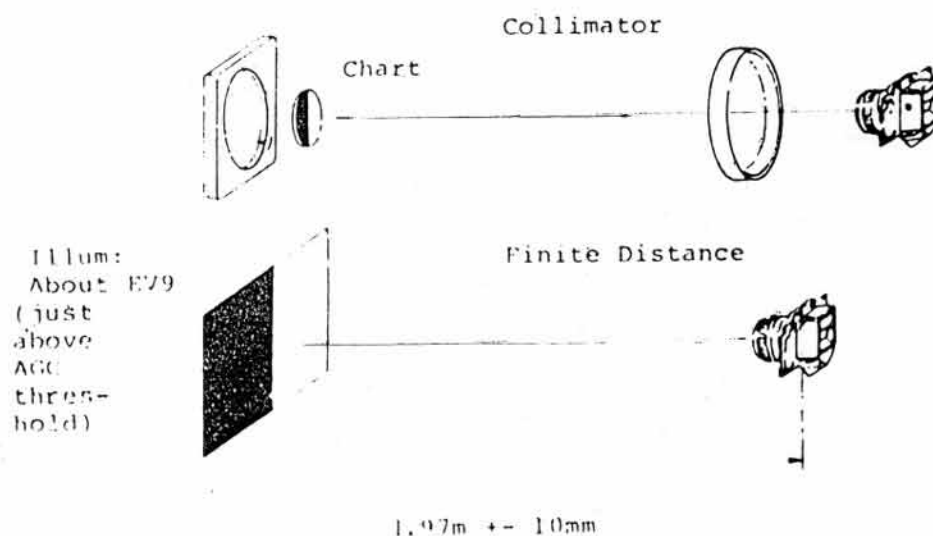
Note 1: See section II.3.1.

11. ADJUSTMENTS

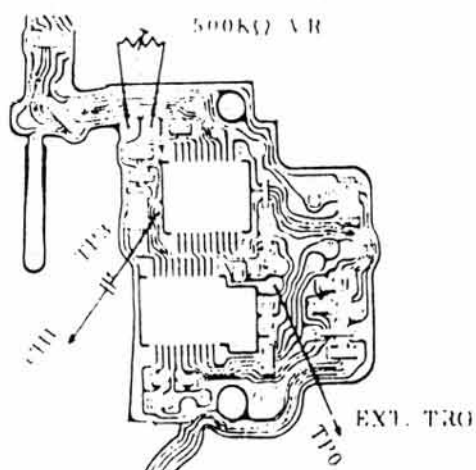
3. QF Adjustments

3.9. Resistor R105 Adjustment

1. Set-up



2. Oscilloscope Coupling and Adjustment



Oscilloscope

Coupling : D.C.

Channel 1: 50mV/div (1:1 probe)

Time Base: 0.5ms/div.(Delay)

Trigger: EXTERNAL(trailing edge)

(If oscilloscope does not have
delay, use 5ms/div. and 10X
magnification).

Because of capacitance
coupling, wait about
30 seconds for D.C.
level to stabilize.

II. ADJUSTMENTS

3. QF Adjustments

3. Adjustment

Test Equipment: Oscilloscope

Tools: 1. QF Test Standard Lens (with graph paper scale,
(See section II.3.1).

2.  Chart

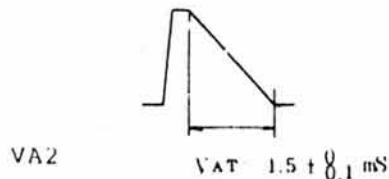
3. 500 KOhm Variable Resistor (set to 500 KOhm)

4. 1 - 3 uF film or Tantalum capacitor (on probe)

Standard:

Above AGC Threshold, at just focus

$$VAT = 1.5 \text{ ms} \pm 0 - 0.05 \text{ ms}$$



VA2 JF waveform

Method:

1. Sensor balance adjustment must have been completed. Remove R105 and install the 500 KOhm variable resistor in its place.
2. Adjust for just focus condition (VA2 maximum), increase the brightness just to the AGC threshold and read VAT at this point. Adjust the variable resistor until VAT is correct.

Higher resistance = Longer VAT
Lower Resistance = Shorter VAT

3. Remove the variable resistor and replace it with a fixed resistor of the same value.

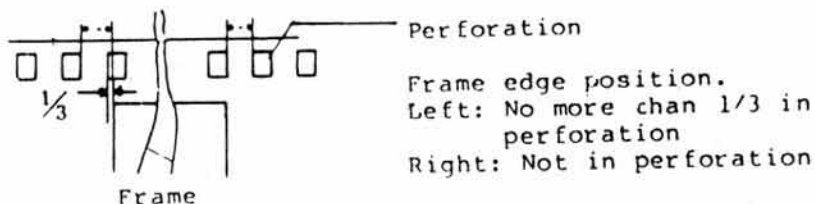
Caution: This standard is for a 90% / 2% reflectance chart. If the chart is soiled, the reflectance will be different. Establish the correct VAT using a known-good body.

II. ADJUSTMENTS

4. Winding Adjustments

4.1. Perforation Adjustment

• 1. Standard:



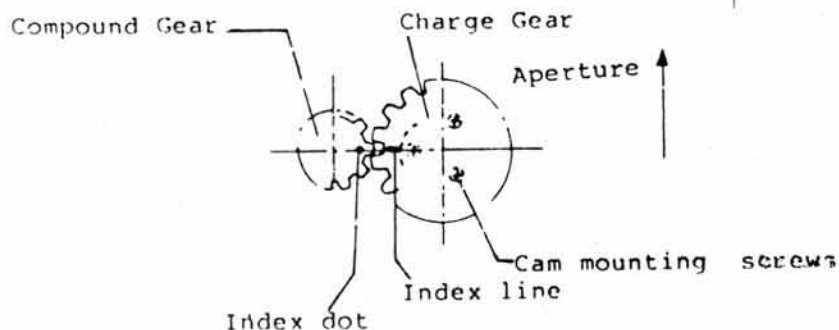
Using a length of film, insert the leader and wind several frames. Apply back tension and check the perforation position.

2. Adjustment

If the position is not correct, adjust as follows. There are two charge gears and the mesh can be changed so there are several possibilities.

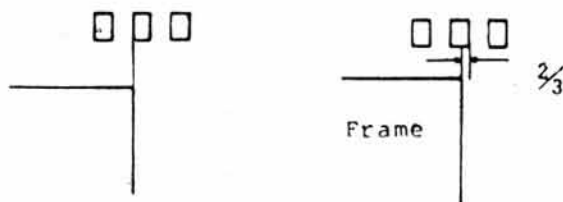
1. Always start with the 050 charge gear. 050 screws: chrome
010 screws: black

With the mechanism wound, mesh the gears as shown below.



2. If the results are as shown below, leave the 050 charge gear in place and change the mesh one tooth.

Example 1: Right edge of frame in perforation



11. ADJUSTMENTS

4. Winding Adjustments

Example 2: Left edge of frame aligned with perforation edge

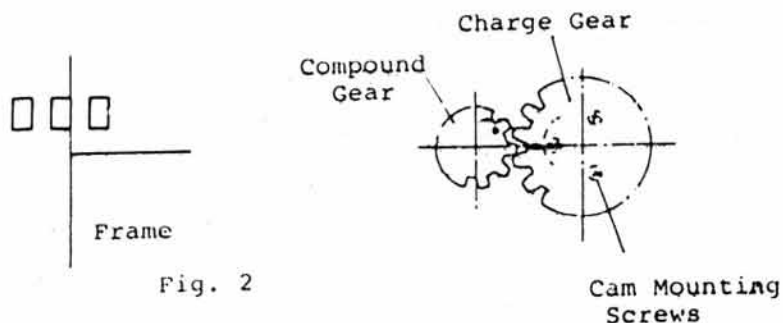


Fig. 2

3. If the results are as shown below in step 1, change to the 010 charge gear and align the compound gear and charge gear indices.

Example: Left edge of aperture in right 2/3 of perforation.

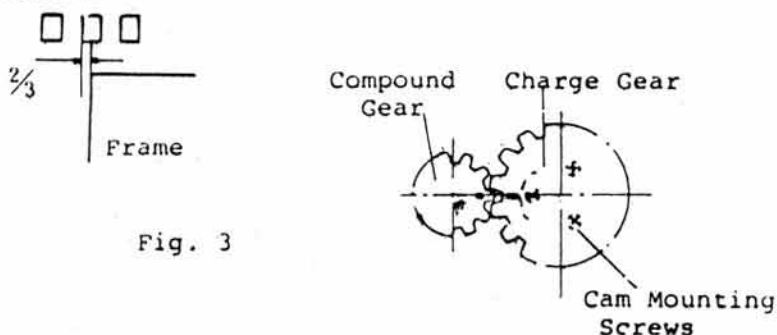


Fig. 3

4. If the results are as shown below in step 1, change to the 010 charge gear and offset the compound gear and charge gear indices one tooth.

Example: Right edge of aperture in right 1/2 of perforation.

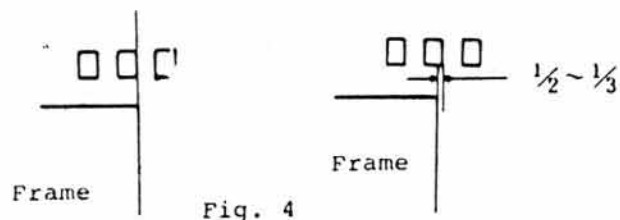
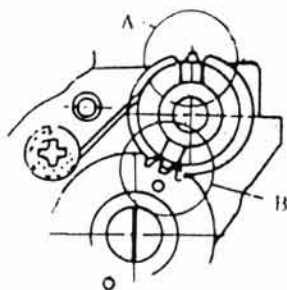


Fig. 4

Example 2: Left edge of perforation aligned with middle 1/3 to 1/2 of perforation.



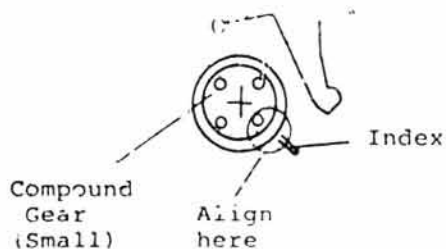
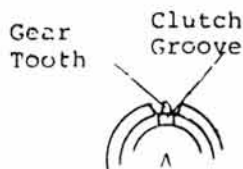
1. Assemble the sprocket clutch gear so the clutch groove align with the gear tooth as shown. (A). (There are 3 points where they align correctly.)



2. Now align this point with the index point on the large compound gear (B).

3. Install the small compound gear on the flatted shaft on the reverse side of the base.

4. Apply clockwise pressure at (A) and check that one of the four marks on the small compound gear align with the index on the base. (C).



II. ADJUSTMENTS

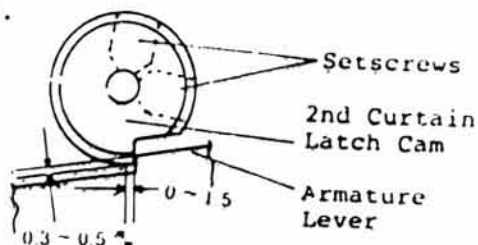
4. Winding Adjustments

3. 2nd Curtain Latch Position

1. Standard: Minus latch (0.0 - 0.15mm)
Mesh 0.3 - 0.5mm.

2. Adjustment

- A. Check the mesh.
- B. Apply the charge spring pressure.
- C. Recheck the mesh.
- D. Check with 2nd curtain magnet power off.
- E. If the mesh is too shallow, adjust and retighten the setscrews.
- F. Apply power to the magnet and check again in the wound position.
- G. Check in the wound condition.



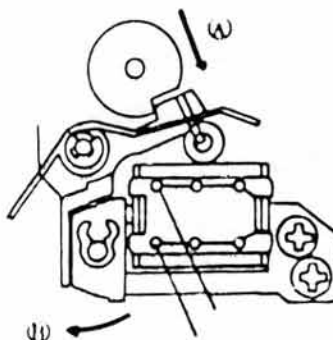
4. 2nd Curtain Magnet

1. Holding Power

- A. Standard : 120 g or over

- B. Check

1. Wind the mechanism.
2. Apply power to magnet (camera power if assembled. 6V, 8mA if not)
3. Press with a correx at (A) and measure the force required to separate the armature from the yoke.
4. If it is too low, change the magnet.



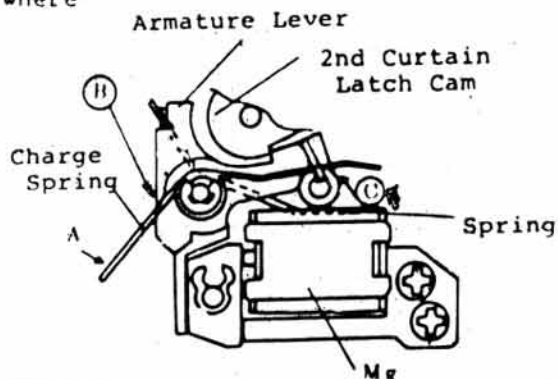
4. Winding Adjustments

2. 2nd Curtain Release Spring Torque

A. Standard: 140 - 170g

B. Check

1. Apply the correx about 1mm from the end of the spring (A).
2. Check the tension just where the spring clears (B).



3. 2nd Curtain Release Return Pressure

A. Standard: More than 60g less than above.

B. Check

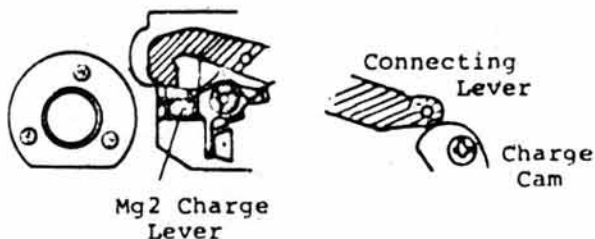
1. Measure at (C).
2. Set the armature against the yoke.
3. Letting the spring return, measure the tension when the armature and yoke part.

4. Overcharge

A. Standard: 0.5 - 0.9mm

B. Adjustment

Check with the connecting lever at the maximum lift of the charge cam. The overcharge of Mg2 Charge lever should be between 0.5 & 0.9mm. Adjust by changing the size of the connecting lever collar. (The check method is identical to the AV-1).



11. ADJUSTMENTS

5. Lubrication and Bonding

This division is divided into four sections, 1. Body, 2. Top Cover, 3. Front Panel, and 4. Shutter Unit. For each subsection, the information is listed numerically, 1. Part Name, 2. Lubricant/ Bond, and 3. Special instructions.

Expendables Order Numbers
(Current as of January, 1982)

Bonds

Plyobond CY9-8001-000

Diabond CY9-8002-000

Arontite L (Blue cap) CY9-8008-000

Oil Retardant

OBF-10 CY9-8051-000

Lubricants

Astroil CY9-8017-000

UTLM 10 CY9-8031-000

LT-SH CY9-8033-000

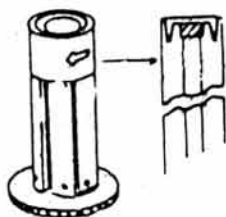
Lozoid 72090 CY9-8037-000

Electrolube 2G-X CY9-8039-000

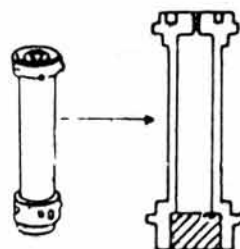
PL-15 CY9-8073-000

I. Body Section

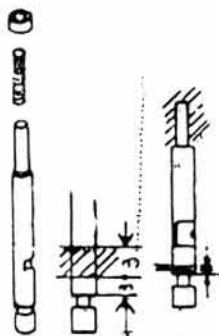
- A. 1. Spool
2. PL-15
3. Apply to hatched area



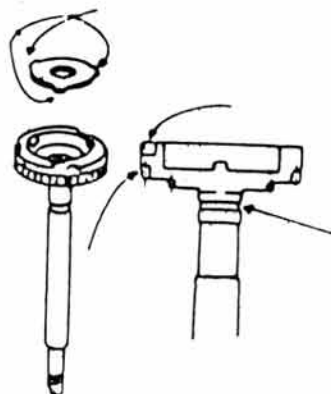
- B. 1. Sprocket
2. PL-15
3. Apply to hatched area



- C. 1. Sprocket Shaft
2. LT-SH
3. Apply to hatched area



- D. 1. Winding Shaft Cover Planter
 2. Arontite L
 3. Apply to arrow-marked points
- E. 1. Winding Shaft Gear
 2. Lozoid 72090
 3. Apply to arrow-marked points



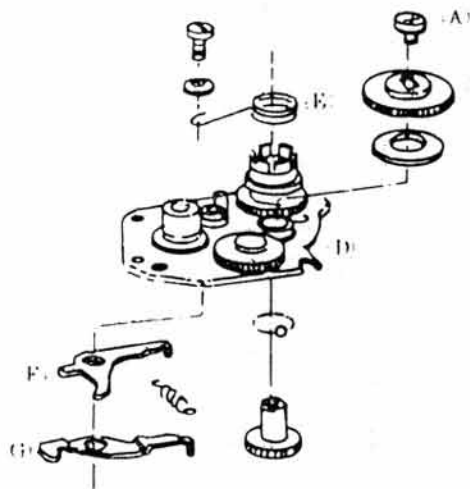
5. Lubrication and Bonding

E. (2)

1. Winding Gear
2. Lozoid 72090
3. Apply to hatched area

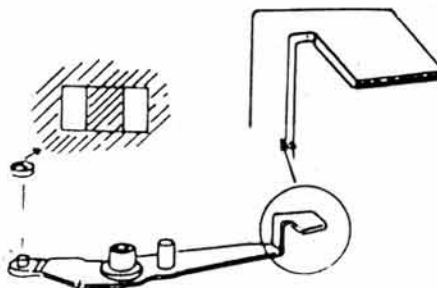


- II. 1. Lower Winding Base
2. Lozoid 72090
3. Apply to cross-hatched area
4. Arontite L (Blue cap)
5. Apply to hatched area



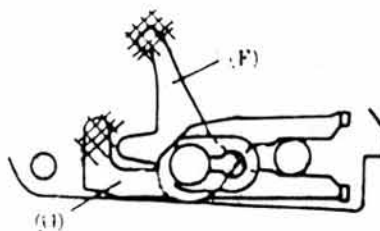
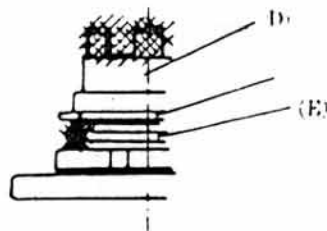
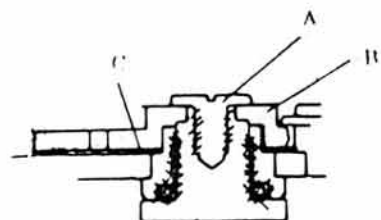
F. 1. Connecting Lever

2. Lozoid 72090
3. All surfaces



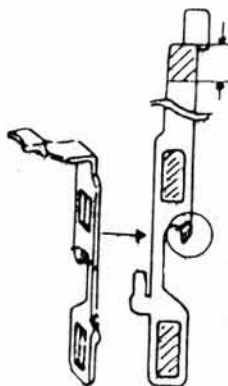
G..1. Connecting Lever

2. Lozoid 72090
3. Apply to cross-hatched area

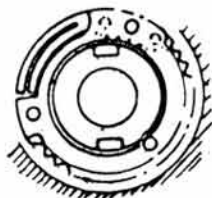


5. Lubrication and Bonding

- I. 1. Back Cover Hook
2. LT-SH
3. Apply to hatched area



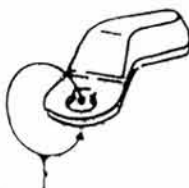
- J. 1. ASA Contact
2. Electrolube 2G-X
3. Apply to hatched area



- K. 1. Rewind Shaft Housing
2. Electrolube 2G-X
3. Apply to hatched area



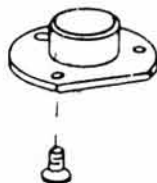
- L. 1. Winding Lever
2. PL-15
3. Apply to arrow-marked points



- M. 1. Neck Strap Lugs
2. Arontite L(Blue cap)
3. Apply to threads



- N. 1. Winding Coupler Screw
2. Arontite L(Blue cap)
3. Apply to threads

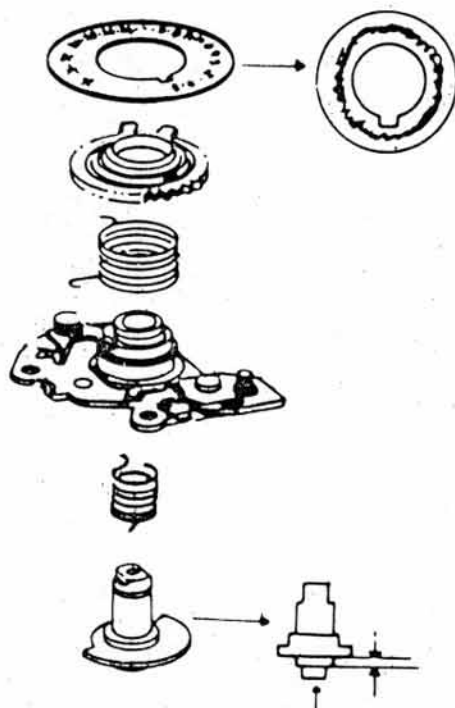


- O. 1. Tripod Socket Screws
2. Arontite L(Blue cap)
3. Apply to threads



5. Lubrication and Banding

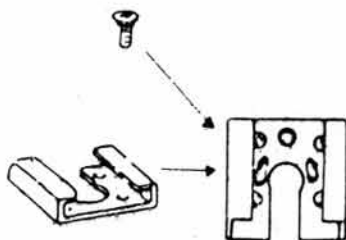
-
- P. 1. Upper Winding Base Parts
2. Plyobord
3. Apply to marked area of dial
4. Lozoid 72090
5. Apply to arrow-marked points



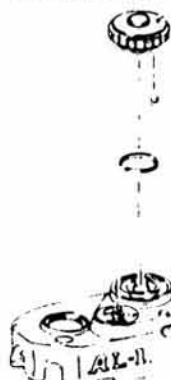
5. Lubrication and Bonding

2. Top Cover

- A. 1. Accessory Shoe
2. Plyobond
3. Apply to marked area

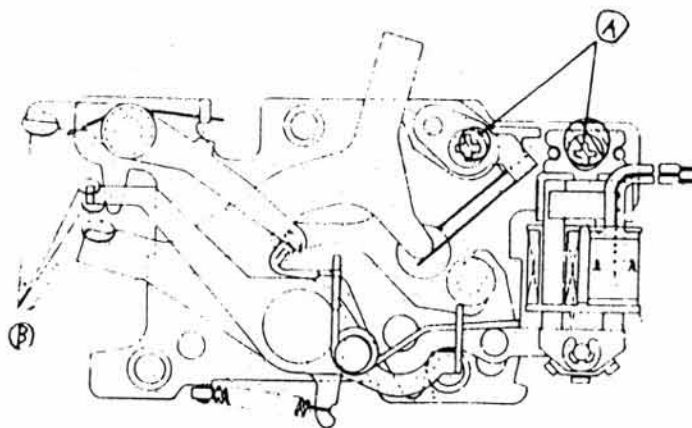


- B. 1. Shutter Button, Dial
1.A. Detent Balls
2.A. FL-15
1.B. Dial Bonding
2. Plyobond
3. Underside of dial



3. Front Panel Unit Parts

- A. 1. Auto Diaphragm Unit
2. Diabond
3. Apply at points marked "A"
2. UTLM 10
3. Apply at points marked "B"



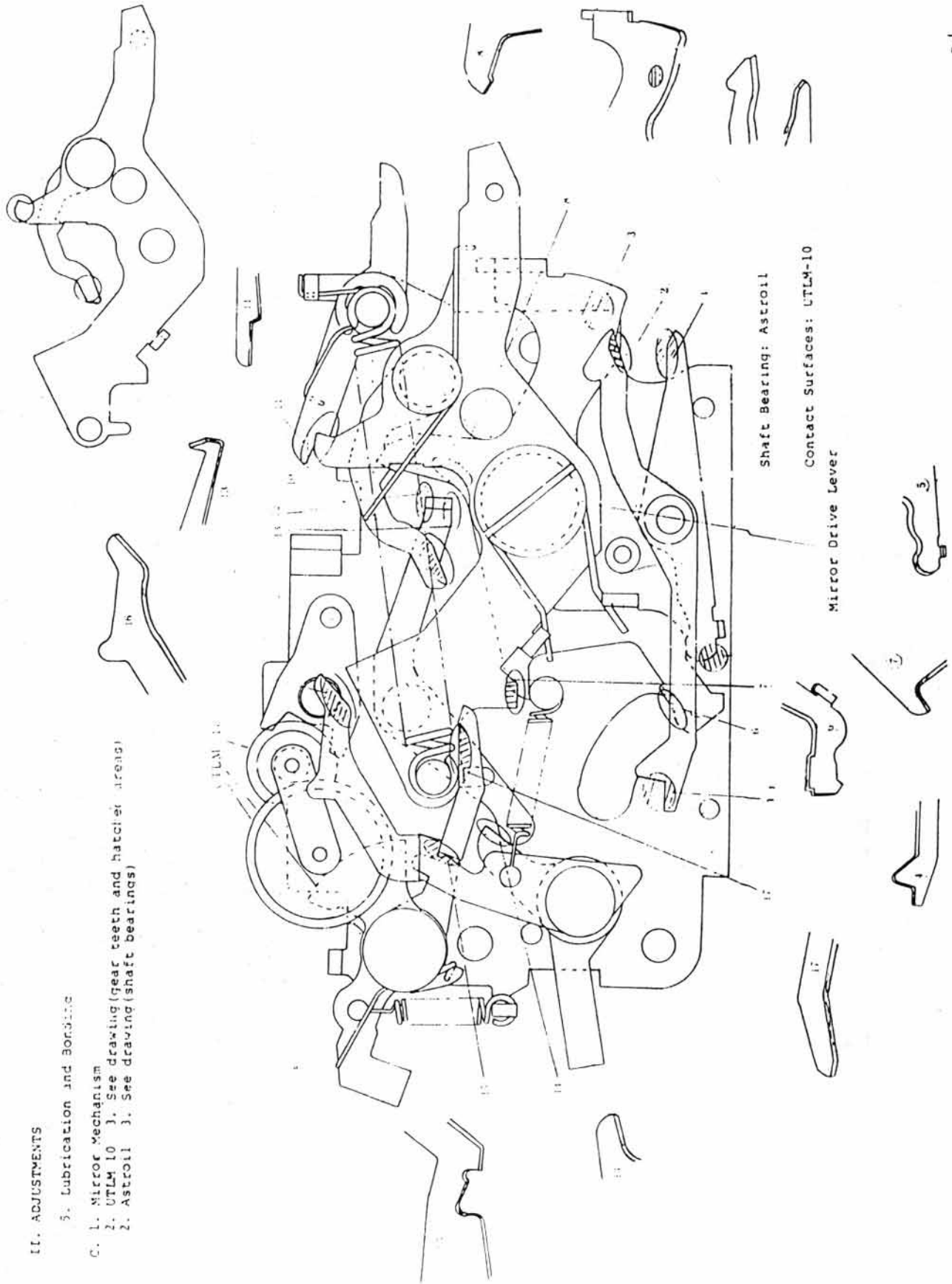
- B. 1. QF IC's (CPU, SFP)
2. Humiseal
3. Apply to pins

II. ADJUSTMENTS

5. Lubrication and Boreline

C. 1. Mirror Mechanism

2. UTLM-10 3. See drawing (gear teeth and hatcher areas)
2. Astrol 3. See drawing (shaft bearings)

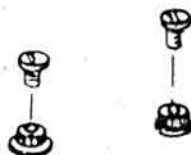


II. ADJUSTMENTS

5. Lubrication and Bonding

4. Shutter Unit

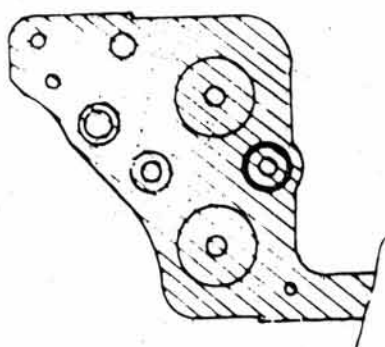
- A. 1. Pinion Gear Screws
2. Arontite L
3. Apply to threads



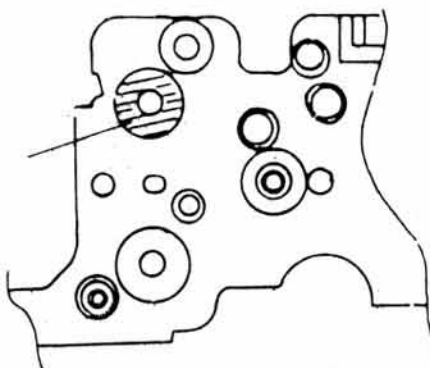
- B. 1. 2nd Curtain Latch Screw
2. Arontite L
3. Apply to threads



- C. 1. Shutter upper Member
2. OilRetardant OBF-10
3. Apply to hatched area



- D. 1. Shutter Lower Member
2. Astroil
3. Apply to hatched areas



- E. 1. 2nd Curtain Pinion Shaft
2. Oil Retardant
3. Apply to all surfaces



- F. 1. Master Gear
2. Astroil
3. Apply to shaft bearing surfaces.



CANON SERVICE TOOLS LIST

CANON AL-1

(REF. NO. C12-1821, 1822)

TEST EQUIPMENT

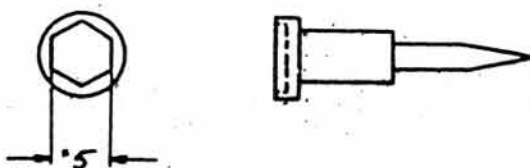
(USE)	(NAME OF TEST EQUIPMENT)
1. Shutter	Shutter Tester (Model 7J-18C) or PA-16 Transistorized Shutter Tester or Simplified Shutter Tester.
2. Exposure Meter	2-1 Canon Light Source 2-2 D.C. Voltage Tester (DDM Model VOAC 77 or VOAC 707) (Measuring Meter Accuracy, Unit: 1mV) 2-3 Ohmmeter 2-4 Standard Brightness Checker (Cds) or Canon Luminance Meter (S.B.C.) 2-5 Oscilloscope (General electrical circuit checks)
3. Range-Viewfinder	3-1 Universal Range-viewfinder Colli- mator or Universal Rangefinder Collimator 3-2 Focusing Charts (3 each) 3-3 Oscilloscope 3-4 D.C. Power Supply (for Light source) 3-5 Service Standard FD 50mm 1:1.4 lens
4. Mirror Angle (45°)	4-1 Universal Type 90° Collimator 4-2 AL-1 Inverted Mount 4-3 Traveling Microscope 4-4 Simplified 90° Collimator (if 4-1 is not available)
5. Field of View	Universal Range-viewfinder or Universal Parallax Collimator
6. FFD	42.14 Dial Gauge
7. Adjustment	7-1 SZ12-7 Torque Gauge (2.0-7.0KgcM) Clockwise (Common to Motor Drive) 7-2 ST42-C12-1401-1S Torque Gauge Head (Common to AE-1) 7-3 Retaining Ring Pliers (Local Purchase) (Common to AE-1) 7-4 Depth Micrometer (Check Max. Aperture Correction Pin height) (Local Purchase)
8. QF Adjustment Stand (for front panel) (Front panel mounts in inverted position)	

SPECIAL SCREW DRIVERS

(Use)

Tightening Sprocket Shaft

CY9-6113-010
 (TB39-CS1-1768-1S)
 (Common to AE-1)



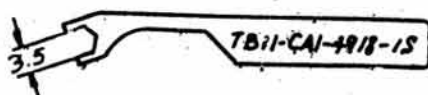
Tightening Winding Lever

CY9-6108-010
 (TB39-CA1-4977-1S)
 (Common to AE-1 and AV-1)



Mirror Angle (45°) Adjusting Spanner

CY9-6026-010
 (TB11-CA1-4918-1S)
 (Common to AE-1 and AV-1)



CANON AL-1 PROGRAM SERVICE PARTS POLICY

1. THE POLICY OF CAMERA SERVICE, TOKYO, IS TO STOCK ALL PARTS NECESSARY TO EFFECT EFFICIENT ECONOMICAL SERVICE. IT IS NEITHER NECESSARY NOR TECHNICALLY FEASIBLE TO STOCK SEPARATELY EVERY PART THAT GOES INTO EACH PRODUCT.

IN ESTABLISHING THE SPARE PARTS LIST, WE CONSIDER REPAIR DIFFICULTY, LABOR COST, SPECIAL TOOL REQUIREMENTS AND INDIVIDUAL PARTS Vs. ASSEMBLED UNIT COST TO DETERMINE IN WHICH FORM PARTS WILL BE STOCKED.

2. RECENT REVIEW HAS SHOWN THAT IT IS MORE ECONOMIC AND ADVANTAGEOUS TO THE CUSTOMER, THE SERVICE FACILITY AND US TO STOCK INDIVIDUAL PARTS UNLESS THERE IS AN OVERRIDING REASON FOR STOCKING PRE-ASSEMBLED UNITS.

THE UNITS LISTED BELOW ARE STOCKED AS UNITS BECAUSE THEY REQUIRE TOOLS OR TECHNIQUES NOT NORMALLY AVAILABLE AT FIELD SERVICE LEVEL.

CG9---2504---000	186 SPOOL GEAR UNIT	CY1---1043---000	CURTAIN
CG9---2564---000	WINDING LEVER[CY1---1044---000	DRUM, 2 nd CURTAIN
CG9---2564---000	WINDING LEVER (BL)	CY1---1045---000	ROLLER
CG9---2622---000	010 GEAR, CHARGE UNIT	CY1---1046---000	SPRING DRUM, 2 nd CURTAIN

IN ADDITION TO THE ABOVE, WHICH ARE STOCKED ONLY AS UNITS, SOME INDIVIDUAL PARTS ARE STOCKED FOR THE FOLLOWING UNITS IN ADDITION TO THE UNIT.

CF1---0831---000	MIRROR UNIT	CG9---2616---000	FRONT COVER (BL)
CG1---0082---000	COVER, BACK	CG9---2619---000	BATTERY CONTACT UNIT
CG1---0155---000	MIRROR MECHANISM	CG9---2999---000	REWIND CRANK UNIT (BL)
CG1---0158---000	ELECTRIC PARTS UNIT	CY1---1040---000	1 ST CURTAIN BRAKE UNIT
CG1---0159---000	AUTO DIAPHRAGM UNIT	CY1---1041---000	2 nd CURTAIN BRAKE UNIT
CG1---0160---000	SHUTTER UNIT	CY1---1042---000	SW 4 CONTACT UNIT
CG1---0164---000	AF UNIT	CY1---1103---000	TOP COVER UNIT
CG9---2598---000	REWIND CRANK UNIT	CY1---1104---000	TOP COVER UNIT (BL)
CG9---2610---000	ELECTRICAL PARTS UNIT	CY1---1105---000	COVER BATTERY
CG9---2615---000	FRONT COVER	CY1---1106---000	ELECTRICAL PARTS UNIT

3. INDIVIDUAL ELECTRICAL COMPONENTS WHICH MAY REQUIRE REPLACEMENT ARE STOCKED. OTHERS ARE LISTED ON THE SCHEMATIC WITH THEIR SPECIFICATIONS.
4. THE SPARE PARTS LIST IS ADJUSTED PERIODICALLY TO INSURE THE NECESSARY PARTS ARE ALWAYS AVAILABLE, AND UNNECESSARY PARTS ARE REMOVED FROM THE STOCK LIST.
5. ASSEMBLIES SHOWN WITH THE N.S. MARK ARE SHOWN FOR CLARITY ONLY. THEY ARE NOT STOCKED IN THE FORM SHOWN.
6. THE PARTS STOCKED AS SERVICE PARTS ARE NOT ALWAYS EXACTLY THE SAME PART USED ON THE ASSEMBLY LINE, BUT THEY ARE PROPERLY INTERCHANGEABLE (SCREWS, WASHERS, LEAD WIRE, ETC.)

キヤノン AL-1 サービス部品について

サービス部品は修理上の精度、工数、コスト、部品の使用頻度等、諸々の事由を勘案し、設定している。

特に、ユニット部品の構成部品の中、使用頻度の少ないものは、サービス部品とはしない。

キヤノン AL-1 においては、次のような部品設定とする。

下記部品はユニットのみをサービス部品とする。

CG9-2504-000 (180) スプールギヤユニット	CY1-1043-000	シャッター幕
CG9-2564-000 巻上げレバー	CY1-1044-000	後幕ドラム
CG9-2591-000 巻上げレバー (BL)	CY1-1045-000	先幕コロ
CG9-2622-000 (010) チャージギヤユニット	CY1-1046-000	先幕スプリングドラム
CG9-2622-000 (050) チャージギヤユニット	CY1-1047-000	後幕スプリングドラム

下記部品はユニット及び使用頻度の高いと考えられる部品をサービス部品とする。

CF1-0831-000 ミラーユニット	CG9-2615-000	エプロンユニット
CG1-0082-000 昇蓋ユニット	CG9-2616-000	エプロンユニット (BL)
CG1-0155-000 ミラーQRユニット	CG9-2619-000	電池接片ユニット
CG1-0158-000 電気部品ユニット	CY1-1040-000	先幕ブレーキユニット
CG1-0159-000 自動絞りユニット	CY1-1041-000	後幕ブレーキユニット
CG1-0160-000 シャッターユニット	CY1-1042-000	SW4 接片ユニット
CG1-0164-000 AV抵抗ユニット	CY1-1103-000	上部カバーユニット
CG9-2598-000 巻戻レクラシユユニット	CY1-1104-000	上部カバーユニット (BL)
CG9-2599-000 巻戻レクラシユユニット (BL)	CY1-1105-000	電池蓋
CG9-2610-000 下面基板ユニット	CY1-1106-000	電気部品ユニット

電気素子の一部のものは、サービス部品としないが修理時のチェックが出来るよう定格を明示している。

※ 当初、サービス部品設定されない部品でも状況に応じ、サービス部品として追加することもある。

※ ユニットの一部分で、サービス部品としないものは「N.S」マークをつけてある。

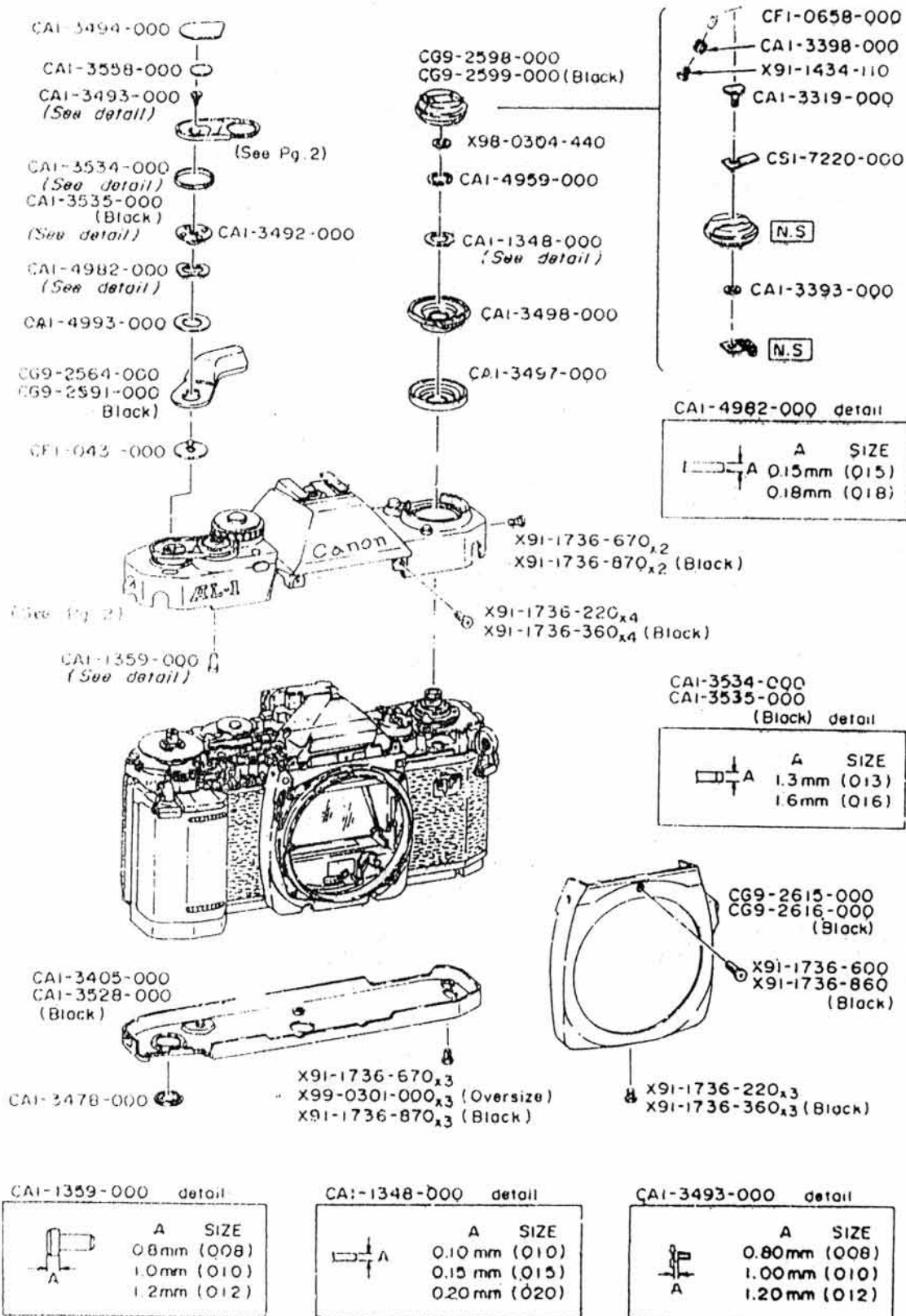
REF.NO.C12-1821,2

CANON AL-1, BLACK AL-1

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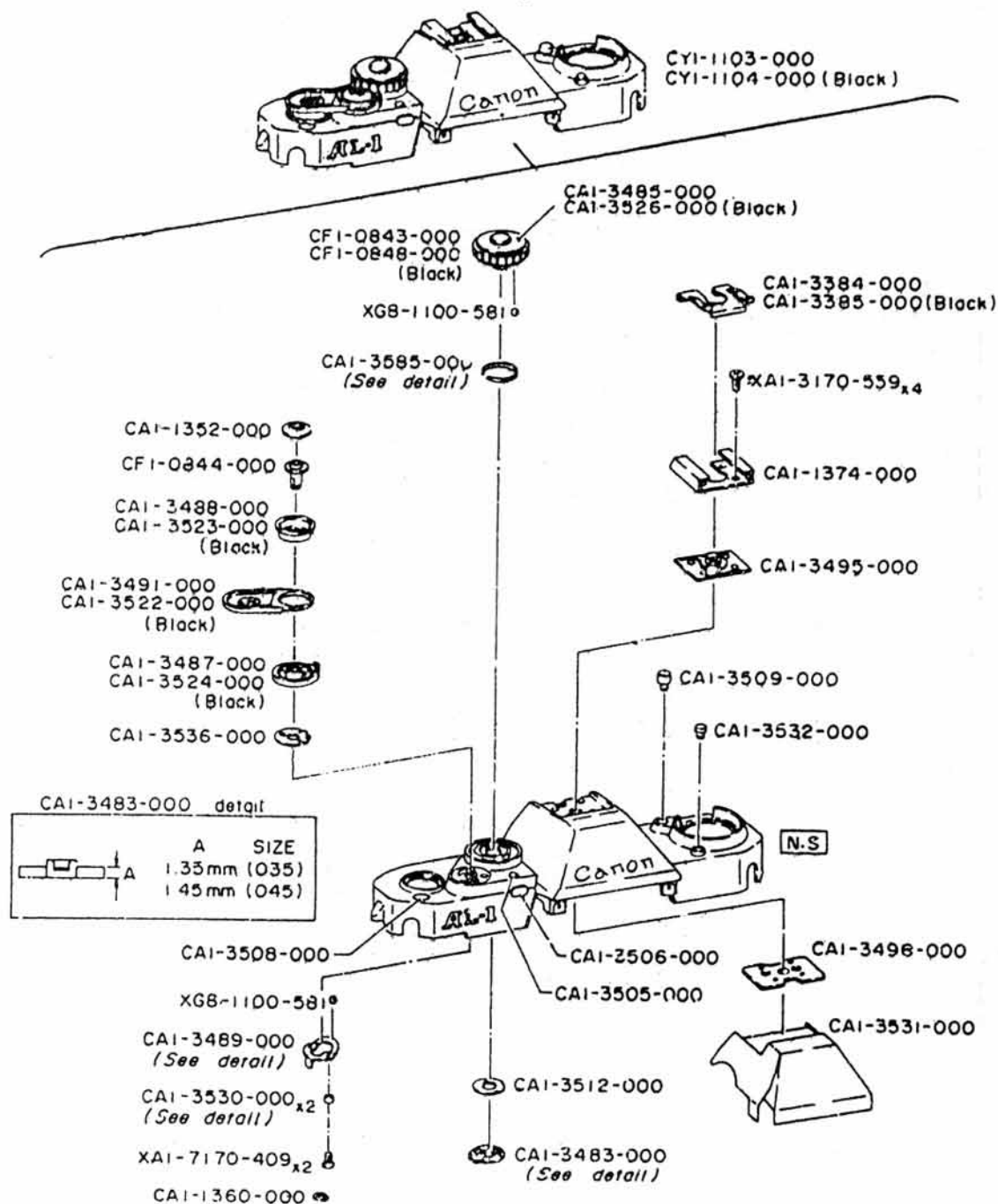
REF.NO.C12-1021,2

PARTS LIST

WINDING LEVER & REWIND CRANK

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-1348-000	D	1	WASHER, SPRING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1359-000	D	1	PIN, RELEASE
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3319-000	B	1	SCREW, REWIND CRANK
	CA1-3393-000	C	1	WASHER, RUBBER
	CA1-3398-000	E	1	KNOB, REWIND CRANK
	CA1-3405-000	B	1	COVER, BASE
	CA1-3478-000	C	1	COVER, COUPLING
	CA1-3492-000	A	1	SCREW, PIN FACE
	CA1-3493-000	D	1	SCREW
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3494-000	C	1	RUBBER
	CA1-3497-000	C	1	DIAL, ASA
	CA1-3498-000	C	1	BASE, ASA DIAL
	CA1-3528-000	B	1	COVER, BASE (BLACK)
	CA1-3534-000	D	1	RING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3535-000	D	1	RING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3558-000	C	1	CAP, REST
	CA1-4959-000	B	1	C RING
	CA1-4982-000	C	1	WASHER, SPRING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-4993-000	C	1	WASHER
	CF1-0431-000	E	1	SEAT, WINDING
	CF1-0658-000	D	1	CRANK, REWIND
	CG9-2564-000	B	1	LEVER, WINDING
	CG9-2591-000	B	1	LEVER, WINDING
	CG9-2598-000	B	1	REWIND CRANK UNIT
	CG9-2599-000	B	1	REWIND CRANK UNIT (BL)
	CG9-2615-000	B	1	COVER, FRONT
	CG9-2616-000	B	1	COVER, FRONT (BL)
	CS1-7220-000	E	1	SPRING, DETENT
	X91-1434-110		1	SCREW, CROSS-RECESS, PH
	X91-1736-220		7	SCREW, CROSS-RECESS, PH
	X91-1736-360		7	SCREW, CROSS-RECESS, PH
	X91-1736-600		1	SCREW, CROSS-RECESS, PH
	X91-1736-670		5	SCREW, CROSS-RECESS, PH
	X91-1736-860		1	SCREW, CROSS-RECESS, PH
	X91-1736-870		5	SCREW, CROSS-RECESS, PH
	X98-0304-440		1	WASHER
	X99-0301-000		3	SCREW, CROSS-RECESS, PH

CANON AL-1, BLACK AL-1



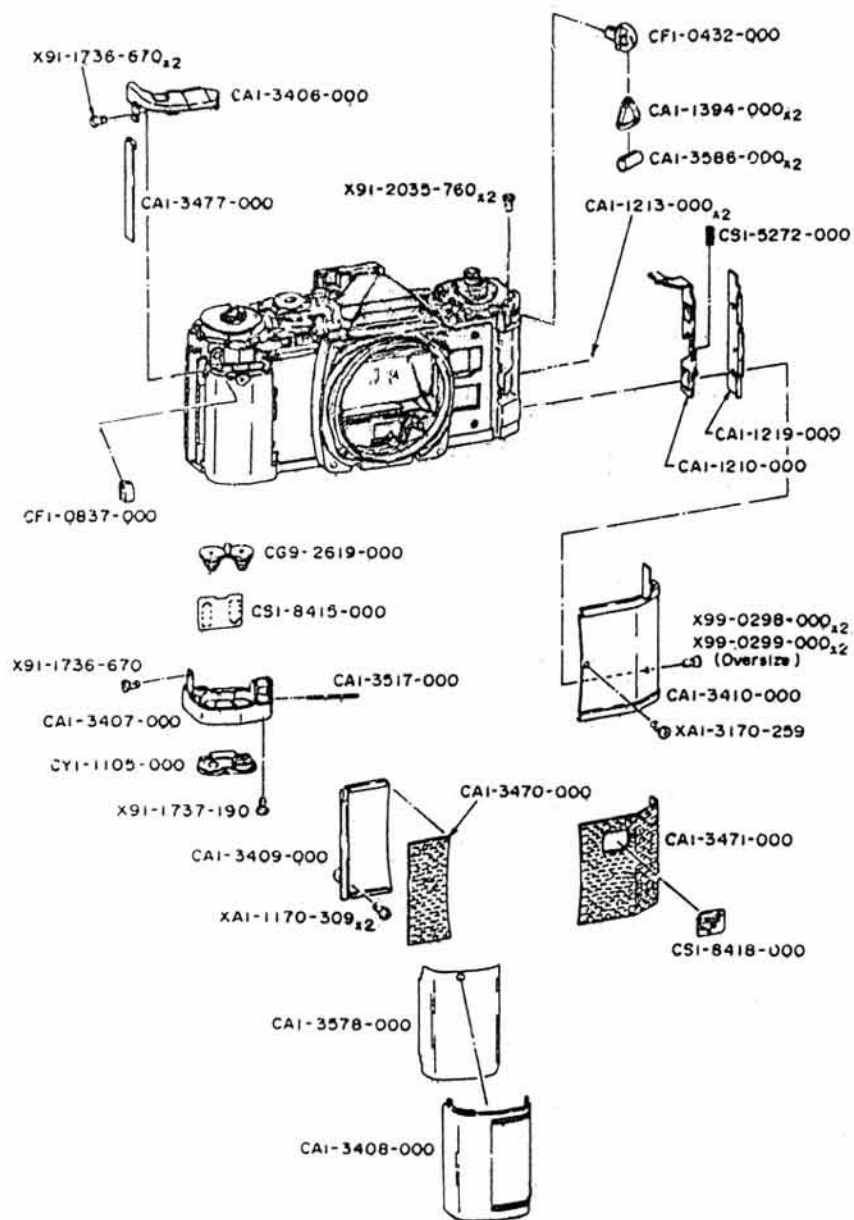
REF. NO. C12-1821.2

PARTS LIST

TOP COVER

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-1352-000	C	1	BUTTON, RELEASE
	CA1-1360-000	C	1	RETAINER
	CA1-1374-000	B	1	SHOE, ACCESSORY
	CA1-3384-000	C	1	SPRING, PLATE
	CA1-3385-000	C	1	SPRING, PLATE (BL)
	CA1-3483-000	D	1	COUPLER, SHUTTER DIAL
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3485-000	D	1	DIAL, SHUTTER
	CA1-3487-000	D	1	RING, SELF-LOCK
	CA1-3488-000	D	1	SEAT, SHUTTER BUTTON
	CA1-3489-000	D	1	ACTIVATOR, SELF-TIMER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3491-000	D	1	REST, FINGER
	CA1-3495-000	B	1	BASE, ACCESSORY SHG
	CA1-3496-000	D	1	PLATE, MOUNTING
	CA1-3505-000	D	1	STOPPER, SELF-TIMER
	CA1-3506-000	D	1	WINDOW, SELF-TIMER
	CA1-3508-000	D	1	WINDOW, FILM COUNTER
	CA1-3509-000	D	1	BUTTON, ASA RELEASE
	CA1-3512-000	D	1	PLATE, CLICK
	CA1-3522-000	D	1	REST, FINGER (BL)
	CA1-3523-000	D	1	SEAT, SHUTTER BUTTON (BL)
	CA1-3524-000	D	1	RING, SELF-LOCK (BL)
	CA1-3526-000	D	1	DIAL, SHUTTER
	CA1-3530-000	E	2	COLLAR, CLICK
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3531-000	C	1	SHEET
	CA1-3532-000	D	1	BUTTON, B.C.
	CA1-3536-000	D	1	PLATE, CLICK
	CA1-3585-000	D	1	SPRING, CLICK
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CF1-0843-000	C	1	BASE, SHUTTER DIAL
	CF1-0844-000	C	1	SHAFT, RELEASE BUTTON
	CF1-0848-000	C	1	BASE, SHUTTER DIAL (BL)
	CY1-1103-000	B	1	TOP COVER UNIT
	CY1-1104-000	B	1	TOP COVER UNIT (BL)
	XA1-3170-559		4	SCREW, CROSS-RECESS, FCH
	XA1-7170-409		2	SCREW, CROSS-RECESS, PH
	XG8-1100-581		2	BALL, STEEL

CANON AL-1, BLACK AL-1



REF.NO:C12-1821,2

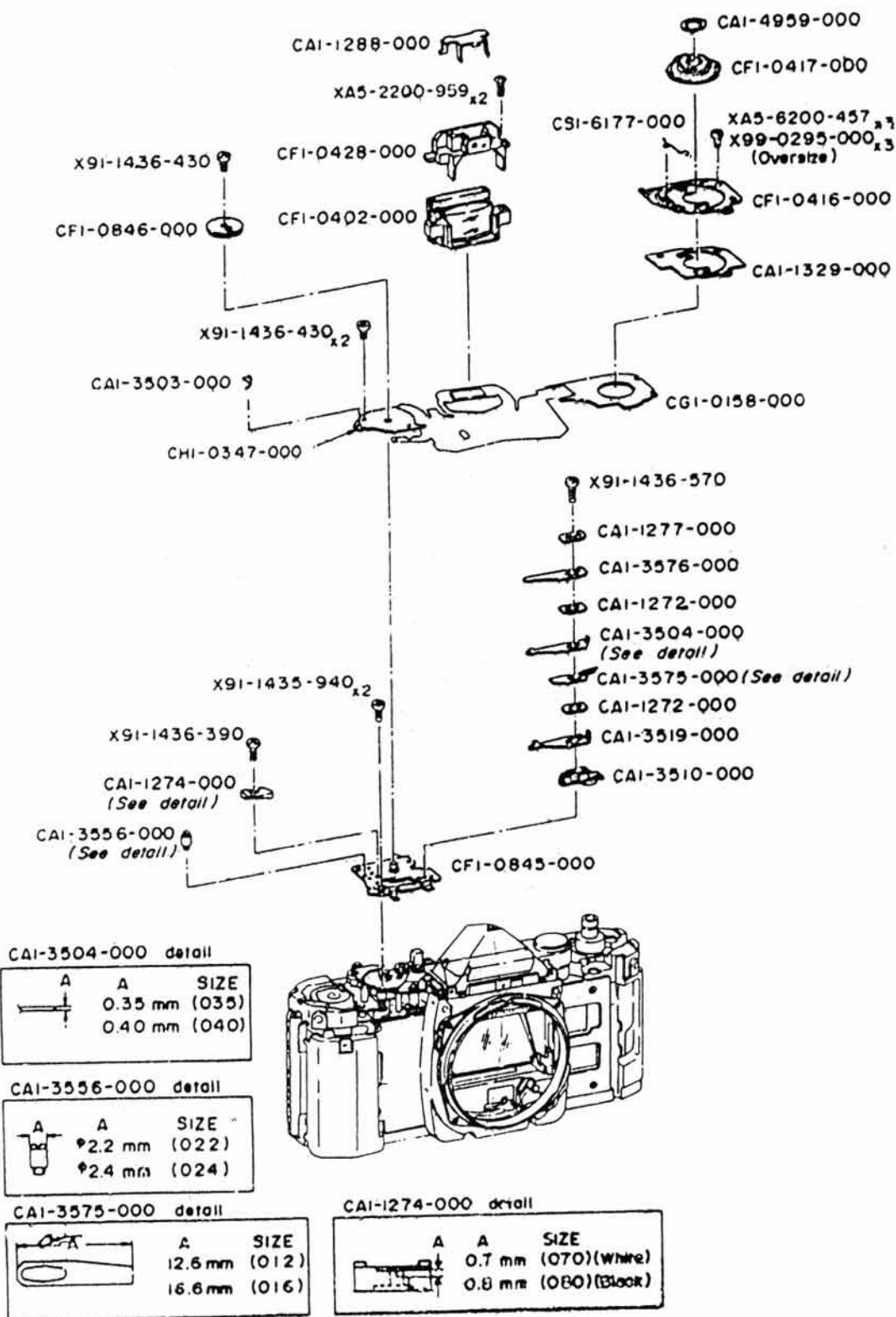
3

PARTS LIST

COVERS

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-1210-000	E	1	HOOK
	CA1-1213-000	E	2	COLLAP.
	CA1-1219-000	E	1	COVER, SPRING
	CA1-1394-000	C	2	ADAPTER, NECK STRAP
	CA1-3406-000	D	1	TOP, GRIP
	CA1-3407-000	D	1	BASE, GRIP
	CA1-3408-000	C	1	COVER, GRIP
	CA1-3409-000	C	1	COVER, RIGHT FRONT
	CA1-3410-000	B	1	COVER, LEFT FRONT
	CA1-3470-000	A	1	COVERING, RIGHT
	CA1-3471-000	A	1	COVERING, LEFT
	CA1-3477-000	C	1	COVER, END
	CA1-3517-000	D	1	SHAFT, HINGE
	CA1-3578-000	C	1	TAPE, GRIP
	CA1-3586-000	C	2	RING, ADAPTOR, NECK STRAP
	CF1-0432-000	D	1	LUG, NECK STRAP
	CF1-0837-000	C	1	LUG, NECK STRAP
	CG9-2619-000	B	1	BATTERY CONTACT UNIT
	CS1-5272-000	D	1	SPRING
	CS1-8415-000	E	1	SEAL, BATTERY
	CS1-8418-000	E	1	LOGO, QF
	CY1-1105-000	C	1	COVER, BATTERY
	XA1-1170-309		2	SCREW, CROSS-RECESS, PH
	XA1-3170-259		1	SCREW, CROSS-RECESS, FCH
	X91-1736-670		3	SCREW, CROSS-RECESS, PH
	X91-1737-190		1	SCREW, CROSS-RECESS, PH
	X91-2035-760		2	SCREW, CROSS-RECESS, PH
	X99-0298-000		2	SCREW, CROSS-RECESS, FCH
	X99-0299-000		2	SCREW, CROSS-RECESS, FCH

CANON AL-1, BLACK AL-1



REF.NO.C12-1821,2

PARTS LIST

FILM COUNTER & ELECTRIC PARTS UNIT

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-1272-000	E	2	INSULATOR
	CA1-1274-000	E	1	STOPPER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1277-000	E	1	SPACER
	CA1-1288-000	C	1	HOLDER, SAC
	CA1-1329-000	D	1	SHEET, INSULATOR
	CA1-3503-000	D	1	CONTACT, SELF TIMER
	CA1-3504-000	D	1	RELEASE CONTACT NO2
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3510-000	E	1	BASE, CONTACT
	CA1-3519-000	D	1	RELEASE CONTACT NO3
	CA1-3556-000	D	1	SCREW
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3575-000	D	1	CONTACT, RELEASE
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3576-000	D	1	RELEASE CONTACT NO1
	CA1-4959-000	B	1	C RING
	CF1-0402-000	B	1	EYEPIECE
	CF1-0416-000	E	1	BASE PLATE, ASA
	CF1-0417-000	C	1	CONTACT, ASA
	CF1-0428-000	D	1	HOLDER, SPC
	CF1-0845-000	E	1	BASE, SHUTTER DIAL
	CF1-0846-000	C	1	WIPER, SHUTTER
	CG1-0158-000	C	1	ELECTRIC PARTS UNIT
	CH1-0347-000	C	1	BOARD, SHUTTER MODE
	CS1-6177-000	D	1	SPRING
	XA5-2200-959		2	SCREW, CROSS-RECESS, PH
	XA5-6200-457		3	SCREW, CROSS-RECESS, PH
	X91-1435-940		2	SCREW, CROSS-RECESS, PH
	X91-1436-390		1	SCREW, CROSS-RECESS, PH
	X91-1436-430		3	SCREW, CROSS-RECESS, PH
	X91-1436-570		1	SCREW, CROSS-RECESS, PH
	X99-0295-000		3	SCREW, CROSS-RECESS, PH

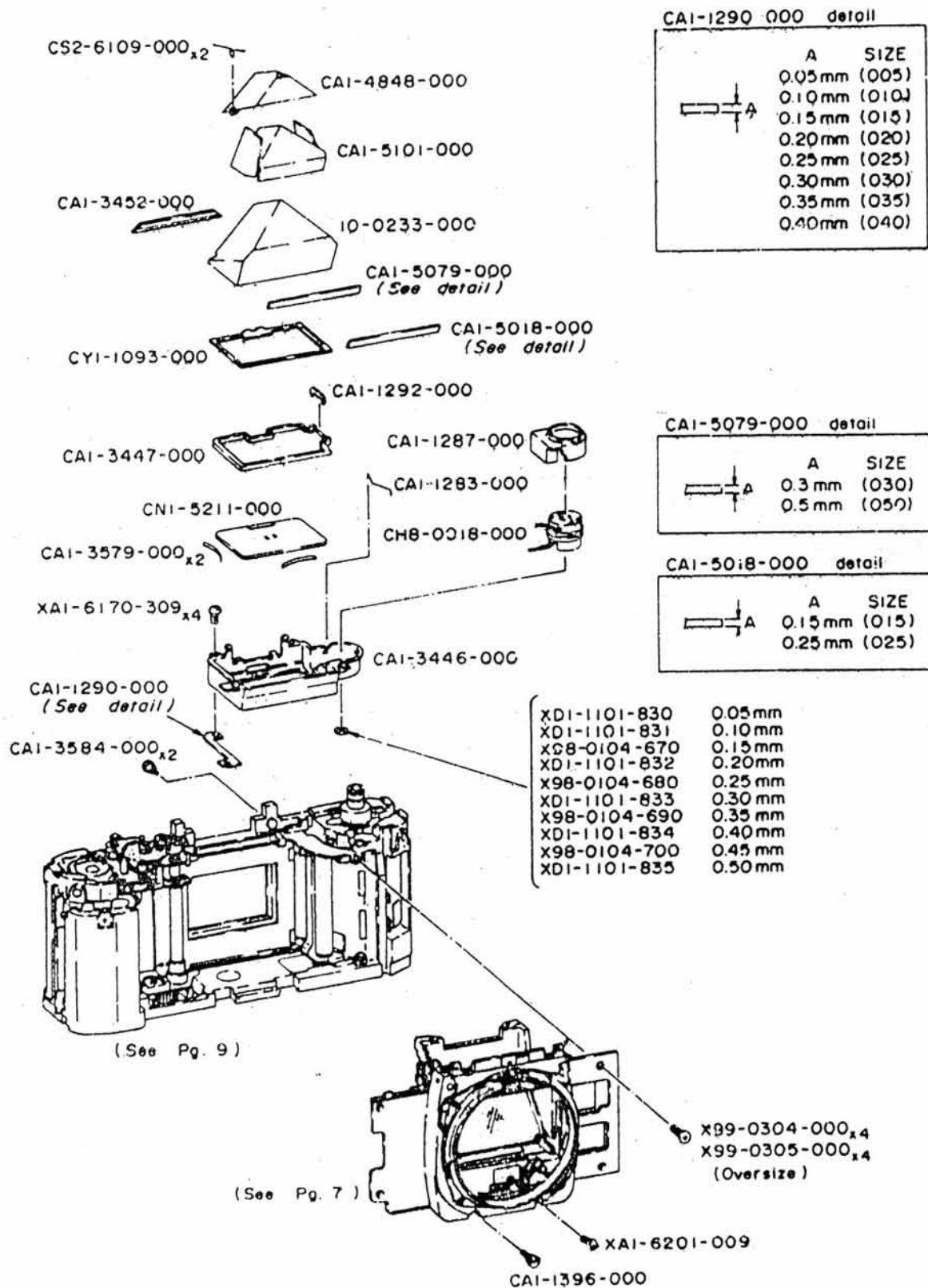
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PARTS LIST

BACK COVER & WINDING PARTS

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	97-3644-000	E	1	COIL SPRING
	CA1-1212-000	E	1	HINGE
	CA1-1220-000	E	1	SHAFT, HINGE
	CA1-1223-000	D	1	GEAR, FRAME COUNTER
	CA1-1225-000	D	1	WASHER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1228-000	D	1	SCREW
	CA1-1239-000	C	1	G RING
	CA1-1278-000	C	1	G RING
	CA1-1317-000	D	1	ROLLER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1403-000	E	1	WASHER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3533-000	E	1	SHAFT
	CA1-3591-000	E	1	LIGET SHIELD
	CF1-0404-000	E	1	BASE, WINDING
	CF1-0423-000	D	1	PLATE, PRESSURE
	CF1-0433-000	D	1	CONTACT, SW5
	CG1-0082-000	C	1	COVER, BACK
	CS1-0182-000	D	1	GEAR, SIZE 100
	CS1-5275-000	D	1	SPRING, COIL
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CS1-6171-000	E	1	SPRING
	CS1-6172-000	D	1	SPRING
	CS1-6173-000	D	1	SPRING
	CS1-6174-000	D	1	SPRING
	CS1-8417-000	E	1	DIAL, FILM COUNTER
	XAS-8170-457		2	SCREW, CROSS-RECESS, FCH
	XAS-8200-457		2	SCREW, CROSS-RECESS, FCH
	X99-0295-000		1	SCREW, CROSS-RECESS, PH
	X99-0304-000		1	SCREW, CROSS-RECESS, FCH
	X99-0305-000		1	SCREW, CROSS-RECESS, FCH
	X99-0406-000		1	SCREW, CROSS-RECESS, PH

CANON AL-1, BLACK AL-1



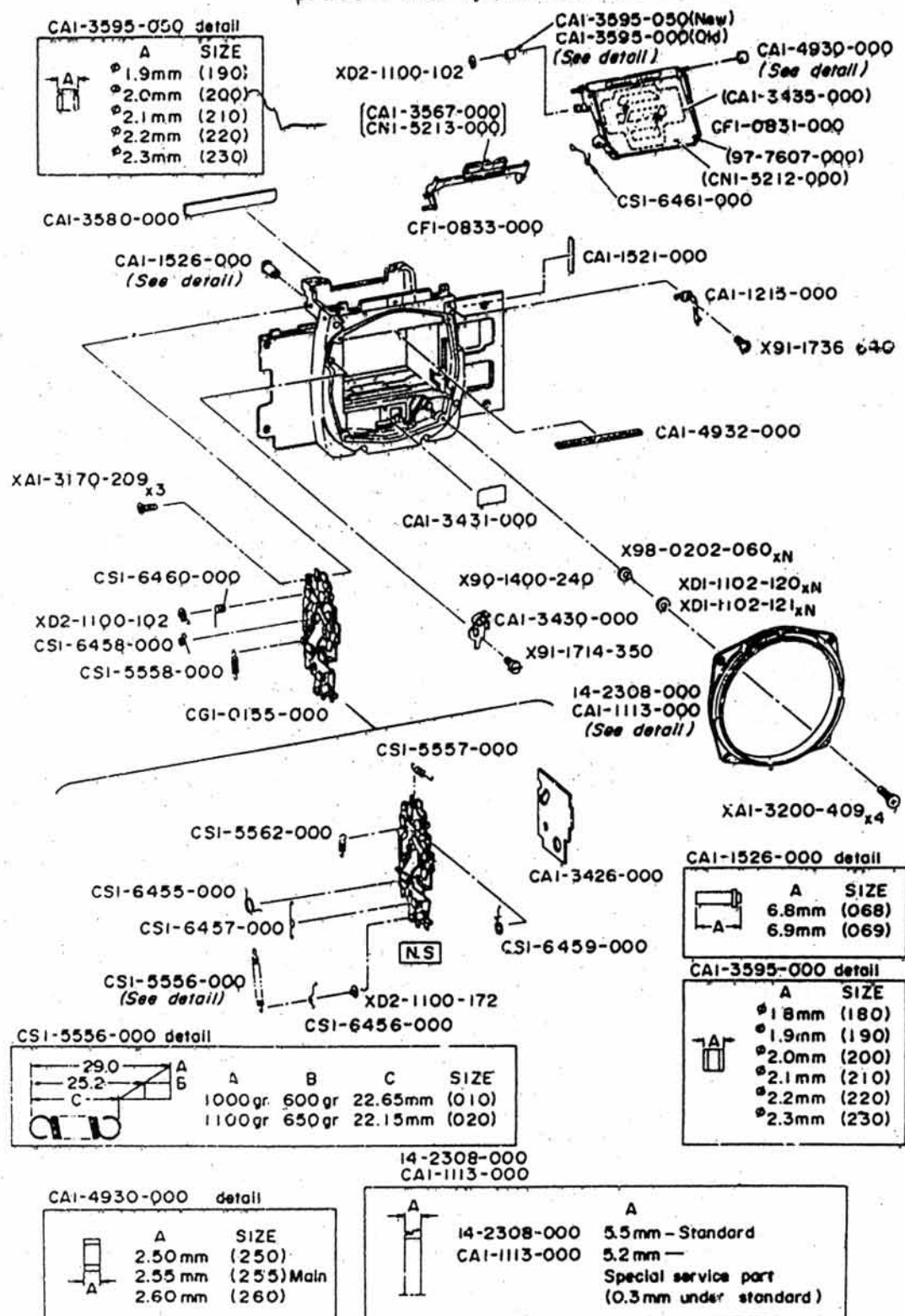
REF.NO.C12-1821,2

PARTS LIST

FINDER PARTS

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	10-0233-000	C	1	PENTAPRISM
	CA1-1283-000	C	1	BAR, METER HOLDER
	CA1-1287-000	C	1	COVER, METER
	CA1-1290-000	D	1	WASHER, ADJUSTING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1292-000	E	1	STOPPER
	CA1-1396-000	D	1	SCREW
	CA1-3446-000	E	1	HOLDER, PENTAPRISM
	CA1-3447-000	E	1	SPACER
	CA1-3452-000	D	1	SPACER
	CA1-3579-000	D	2	PLATE SPRING
	CA1-3584-000	C	2	SCREW
	CA1-4848-000	E	1	HOLDER, PENTAPRISM
	CA1-5018-000	E	1	SPACER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-5079-000	D	1	SPACER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-5101-000	E	1	COVER, PENTAPRISM
	CH8-0018-000	C	1	METER
	CN1-5211-000	C	1	SCREEN, FOCUSING
	CS2-6102-000	D	2	SPRING
	CY1-1093-000	C	1	MASK, FINDER
	XA1-6170-309		4	SCREW, CROSS-RECESS, PH
	XA1-6201-009		1	SCREW, CROSS-RECESS, PH
	XD1-1101-830		1	WASHER
	XD1-1101-831		1	WASHER
	XD1-1101-832		1	WASHER
	XD1-1101-833		1	WASHER
	XD1-1101-834		1	WASHER
	XD1-1101-835		1	WASHER
	X98-0104-670		1	WASHER
	X98-0104-680		1	WASHER
	X98-0104-690		1	WASHER
	X98-0104-700		1	WASHER
	X99-0304-000		4	SCREW, CROSS-RECESS, FCH
	X99-0305-000		4	SCREW, CROSS-RECESS, FCH

CANON AL-1, BLACK AL-1



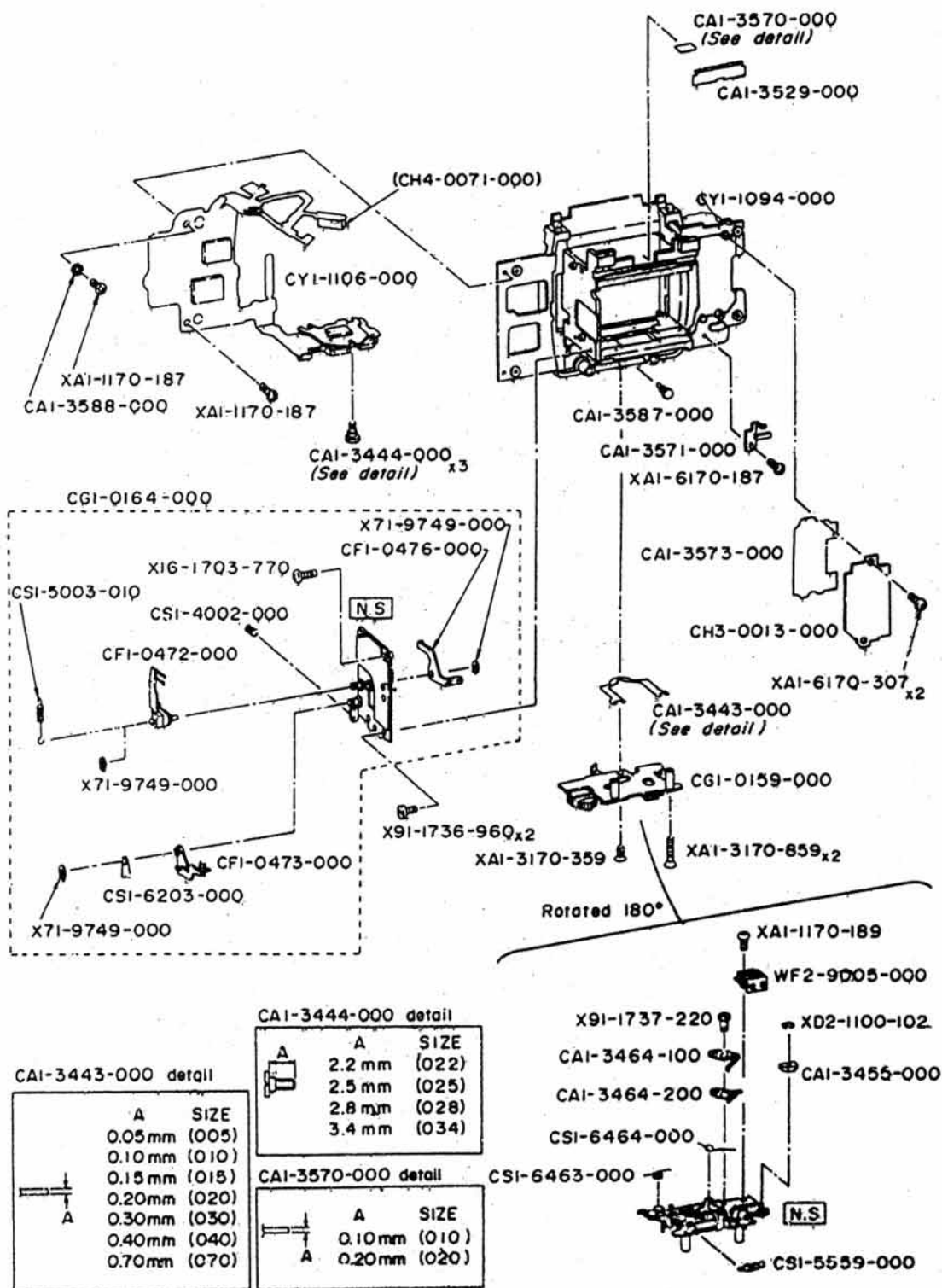
REF.NO.C12-1821,2

PARTS LIST

MIRROR MECHANISM

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	14-2308-000	B	1	BODY MOUNT
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	97-7607-500	C	2	MIRROR HOLDER
	CA1-1113-000	D	1	BODY MOUNT
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1213-000	D	1	CONTACT
	CA1-1521-000	E	1	BOARD, PRINTED CIRCUIT
	CA1-1526-000	D	1	PIN, MAX. APERTURE CORRECTION
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3426-000	E	1	LIGHT SHIELD
	CA1-3430-000	D	1	BRAKLET, LIGHT SHIELD ADJ.
	CA1-3431-000	D	1	PANEL, COSMETIC
	CA1-3433-000	E	1	1"X5" MIRROR
	CA1-3567-000	D	1	TAPE, SUB-MIRROR
	CA1-3580-000	E	1	SHIELD, LIGHT
	CA1-3595-000	E	1	COLLAR
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3595-050	E	1	COLLAR
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-4930-000	E	1	COLLAR
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-4932-000	C	1	CUSHION
	CF1-0831-000	C	1	MIRROR UNIT
	CF1-0833-000	C	1	SUB MIRROR UNIT
	CG1-0155-000	D	1	MIRROR MECHANISM
	CN1-5212-000	C	1	MIRROR
	CN1-5213-000	C	1	MIRROR, SUB
	CS1-5556-000	E	1	SPRING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CS1-5557-000	E	1	SPRING
	CS1-5558-000	E	1	SPRING
	CS1-5562-000	E	1	SPRING
	CS1-6455-000	E	1	SPRING
	CS1-6456-000	E	1	SPRING
	CS1-6457-000	E	1	SPRING
	CS1-6458-000	E	1	SPRING
	CS1-6459-000	E	1	SPRING
	CS1-6460-000	E	1	SPRING
	CS1-6461-000	E	1	SPRING
	XA1-3170-209		3	SCREW, CROSS-RECESS, FCH
	XA1-3200-409		4	SCREW, CROSS-RECESS, FCH
	XD1-1102-120		1	WASHER
	XD1-1102-121		1	WASHER
	XD2-1100-102		2	E RING
	XD2-1100-172		1	E RING
	X90-1400-240		1	SETSCREW, SLOTTED, HLCP
	X91-1714-350		1	SCREW, CROSS-RECESS, PH
	X91-1736-340		1	SCREW, CROSS-RECESS, PH
	X98-0202-060		1	WASHER

CANON AL-1, BLACK AL-1



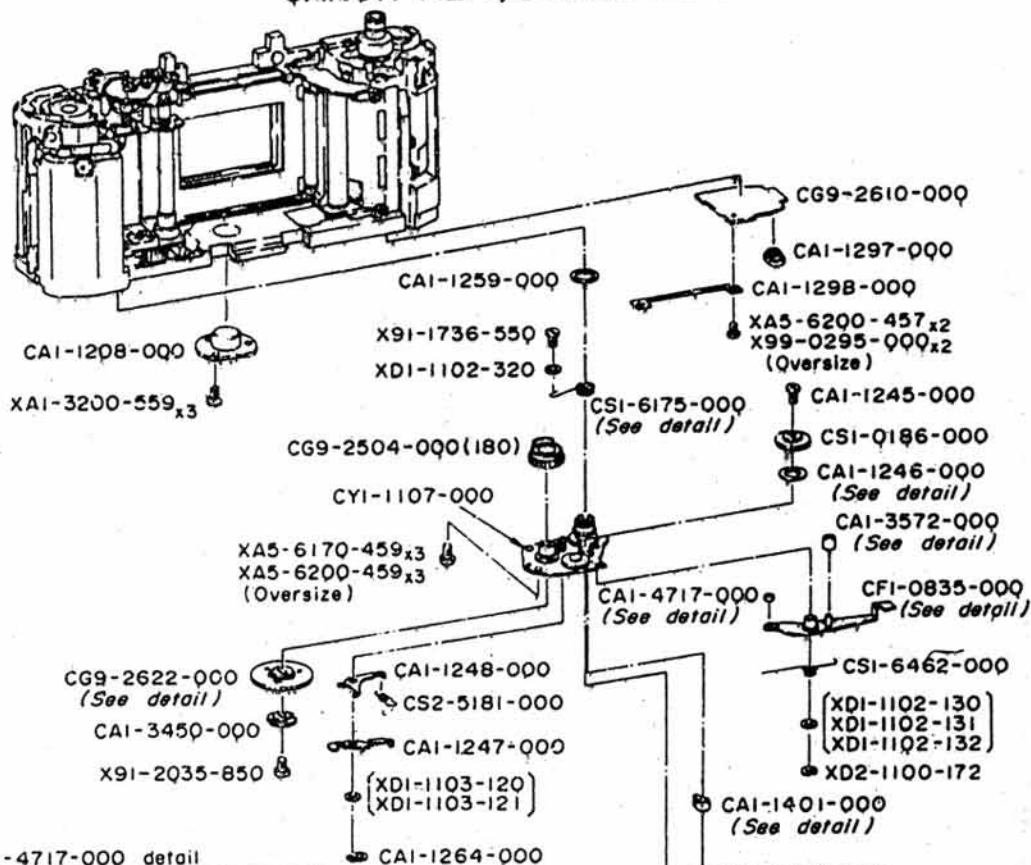
REF.NO.C12-1821,2

PARTS LIST

FRONT PANEL.

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-3443-000	D	1	WASHER, SENSOR
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3444-000	D	3	SCREW
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3455-000	D	1	ARMATURE, 1ST RELEASE
	CA1-3464-100	D	1	CONTACT, GND
	CA1-3464-200	D	1	CONTACT, INDICATOR
	CA1-3529-000	D	1	COVER, LED
	CA1-3570-000	D	1	WASHER, LED
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-3571-000	D	1	CONTACT, DC-DC GND
	CA1-3573-000	D	1	INSULATOR, DC-DC
	CA1-3587-000	D	1	SCREW, SENSOR ADJ
	CA1-3588-000	D	1	WASHER
	CF1-0472-000	E	1	BRUSH, AVC
	CF1-0473-000	C	1	BRUSH, AV
	CF1-0476-000	D	1	LEVER, DIAPHRAGM SIGNAL
	CG1-0159-000	D	1	AUTO DIAPHRAGM UNIT
	CG1-0164-000	D	1	AV UNIT
	CH3-0013-000	C	1	CONVERTER, DC-DC UTO 249
	CH4-0071-000	E	1	LED LS003EC
	CS1-4002-000	E	1	STOPPER
	CS1-5003-010	D	1	SPRING
	CS1-5559-000	E	1	SPRING COIL
	CS1-6203-000	E	1	SPRING
	CS1-6463-000	E	1	SPRING
	CS1-6464-000	E	1	SPRING
	CY1-1094-000	E	1	FRONT PANEL ASSY
	CY1-1106-000	C	1	ELECTRIC PARTS UNIT
	WF2-9005-000	D	1	MAGNET, 1ST RELEASE
	XA1-1170-187		2	SCREW, CROSS-RECESS, PH
	XA1-1170-189		1	SCREW, CROSS-RECESS, PH
	XA1-3170-189		1	SCREW, CROSS-RECESS, FCH
	XA1-3170-359		1	SCREW, CROSS-RECESS, FCH
	XA1-3170-859		2	SCREW, CROSS-RECESS, FCH
	XA1-6170-187		1	SCREW, CROSS-RECESS, PH
	XA1-6170-307		2	SCREW, CROSS-RECESS, PH
	XD2-1100-102		1	E RING
	X16-1703-770		1	SCREW, CROSS-RECESS, PH
	X71-9749-000		3	RETAINER
	X91-1736-960		2	SCREW, CROSS-RECESS, FCH
	X91-1737-220		1	SCREW, CROSS-RECESS, PH

CANON AL-1, BLACK AL-1



CAI-4717-000 detail

A	SIZE
Φ3.0 mm	(030)
Φ3.2 mm	(032)
Φ3.3 mm	(033)
Φ3.4 mm	(034)
Φ3.5 mm	(035)
Φ3.6 mm	(036)
Φ3.7 mm	(037) Main
Φ3.8 mm	(038)
Φ4.0 mm	(040)

CSI-6175-000 detail

d	D	SIZE
0.30 mm	Φ6.3 mm	(303)
0.30 mm	Φ6.4 mm	(304)
0.30 mm	Φ6.5 mm	(305)

CAI-1246-000 detail

A	SIZE
0.1 mm	(100)
0.2 mm	(200)

CAI-3572-000 detail

A	SIZE
Φ2.3 mm	(023) Milky
Φ2.6 mm	(026) Brown
Φ2.9 mm	(029) Milky
Φ3.2 mm	(032) Black

CAI-1401-000 detail

A	B	C	SIZE
R5.2 mm	4.3 mm	4.85 mm	(052) Main
R5.7 mm	4.8 mm	5.35 mm	(057) Yellow

CG9-2622-000 detail

A	SIZE	SCREW
0°	(010)	Black
3°45'	(050)	

CFI-0835-000 detail

A	B	C	SIZE
12.49 mm	12.40 mm	1.48 mm	(049) No Mark
12.69 mm	12.60 mm	1.50 mm	(089) Mark

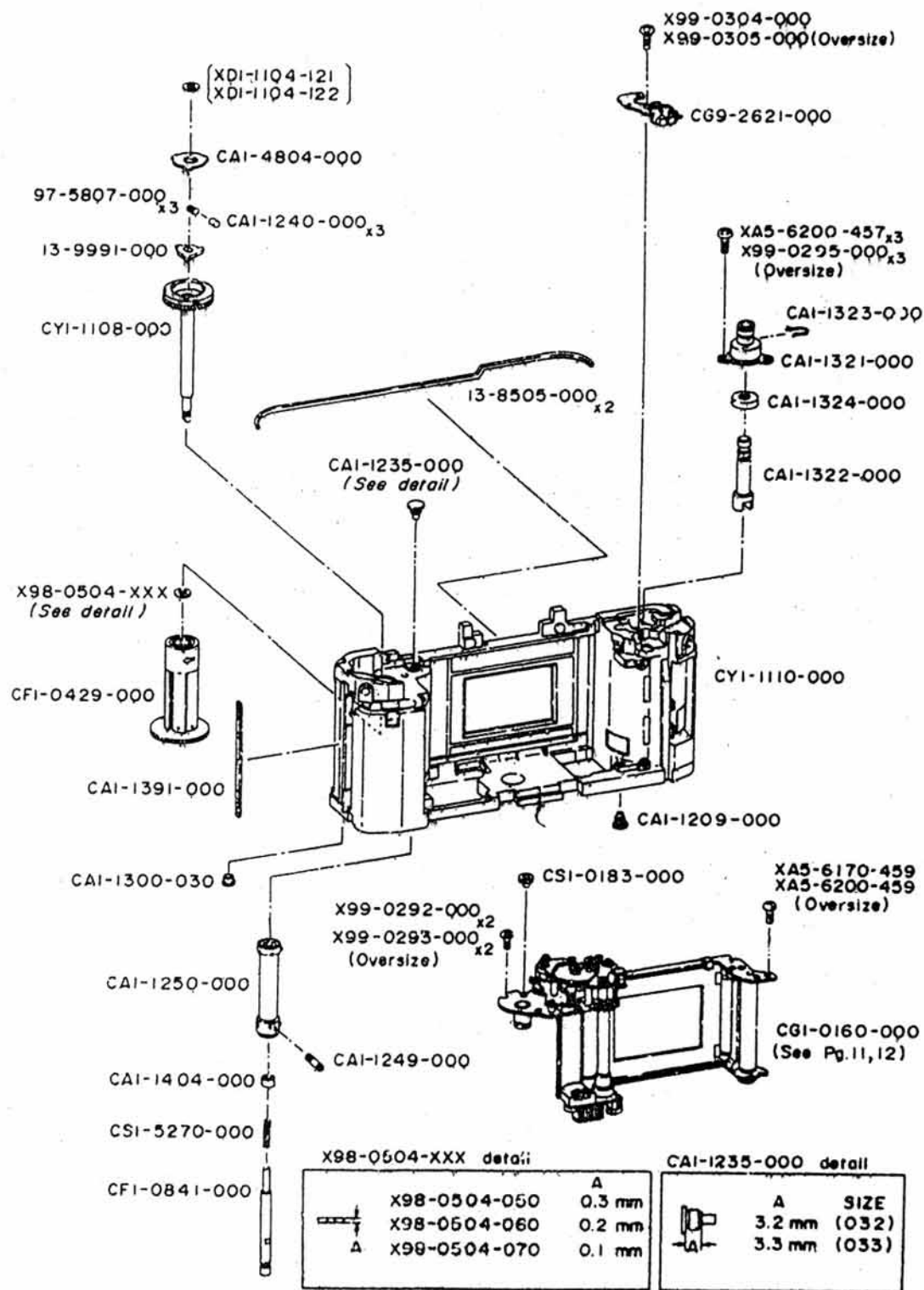
REF.NO.C12-1821,2

PARTS LIST

WINDING MECHANISM

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-1208-000	C	1	SCREW, TRIPOD
	CA1-1245-000	D	1	SCREW, LEFT HANDED
	CA1-1246-000	E	1	SPACER
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1247-000	D	1	LEVER, RA 1
	CA1-1248-000	D	1	LEVER, RA 2
	CA1-1259-000	E	1	SHIELD, LIGHT
	CA1-1264-000	C	1	G RING
	CA1-1297-000	D	1	BASE, WINDER TERMINAL
	CA1-1298-000	C	1	LUG
	CA1-1401-000	D	1	PAWL
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1403-000	D	1	COLLAR, ECCENTRIC
	CA1-3450-000	D	1	COUPLER, WINDING
	CA1-3572-000	D	1	COLLAR
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-4717-000	E	1	COLLAR
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CF1-0835-000	D	1	LEVER, CONNECTING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CG9-2504-000 (180)	D	1	SPOOL GEAR UNIT
	CG9-2610-000	D	1	ELECTRIC PARTS UNIT
	CG9-2622-000	D	1	GEAR, CHARGE UNIT
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CS1-0185-000	E	1	GEAR
	CS1-0186-000	E	1	GEAR
	CS1-6175-000	D	1	SPRING
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CS1-6178-000	D	1	SPRING
	CS1-6462-000	E	1	SPRING
	CS2-5181-000	E	1	SPRING, COIL
	CY1-1107-000	E	1	BASE, WINDING
	XA1-1170-609		1	SCREW, CROSS-RECESS, PH
	XA1-3200-559		2	SCREW, CROSS-RECESS, FCH
	XA5-6170-459		3	SCREW, CROSS-RECESS, PH
	XA5-6200-457		2	SCREW, CROSS-RECESS, PH
	XA5-6200-459		3	SCREW, CROSS-RECESS, PH
	XD1-1102-130		1	WASHER
	XD1-1102-131		1	WASHER
	XD1-1102-132		1	WASHER
	XD1-1102-320		1	WASHER
	XD1-1103-120		1	WASHER
	XD1-1103-121		1	WASHER
	XD2-1100-172		1	E RING
	XG8-1100-541		14	BALL, STEEL
	X91-1736-550		1	SCREW, CROSS-RECESS, PH
	X91-2035-850		1	SCREW, CROSS-RECESS, PH
	X99-0295-000		2	SCREW, CROSS-RECESS, PH

CANON AL-1, BLACK AL-1



REF. NO. C12-1821,2

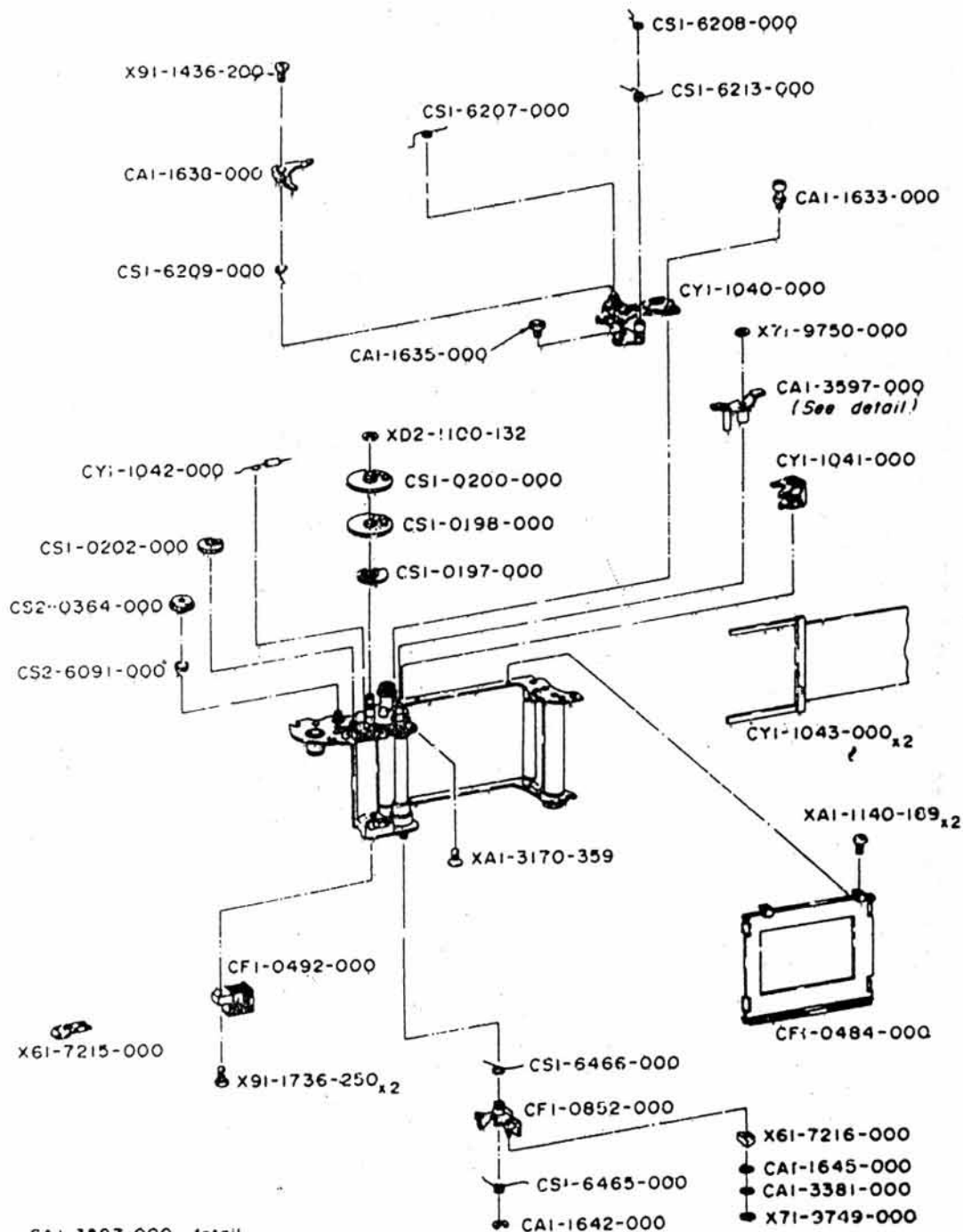
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PARTS LIST

SPOOL & SPROCKET

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	13-8505-000	A	2	LIGHT SHIELD
	13-9991-000	D	1	CLUTCH CAM
	97-5807-000	B	3	COIL SPRING
	CA1-1209-000	E	1	SCREW, SHUTTER GUIDE
	CA1-1235-000	E	1	SCREW
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CA1-1240-000	E	3	ROLLER
	CA1-1249-000	C	1	SCREW
	CA1-1250-000	D	1	SPROCKET
	CA1-1300-030	E	1	BUSH
	CA1-1321-000	E	1	HOUSING, REWIND CRANK
	CA1-1322-000	C	1	SHAFT, REWIND
	CA1-1323-000	D	1	SPRING
	CA1-1324-000	D	1	COVER, SHAFT
	CA1-1391-000	E	1	SHIELD, LIGHT
	CA1-1404-000	E	1	COLLAR
	CA1-4804-000	E	1	PLATE, COVER
	CF1-0429-000	D	1	SPOOL
	CF1-0841-000	C	1	SHAFT, SPROCKET
	CG1-0160-000	C	1	SHUTTER UNIT
	CG9-2621-000	D	1	MICRO, SWITCH UNIT
	CS1-0183-000	E	1	IDLER, COUNTER
	CS1-5270-000	E	1	SPRING, COIL
	CY1-1108-000	D	1	SHAFT, WINDING
	CY1-1110-000	E	1	BODY
	XA5-6170-459		1	SCREW, CROSS RECESS, PH
	XA5-6200-457		3	SCREW, CROSS-RECESS, PH
	XA5-6200-459		1	SCREW, CROSS-RECESS, PH
	XD1-1104-121		1	WASHER
	XD1-1104-122		1	WASHER
	X98-0504-050		1	WASHER
	X98-0504-060		1	WASHER
	X98-0504-070		1	WASHER
	X99-0292-000		2	SCREW, CROSS-RECESS, PH
	X99-0293-000		2	SCREW, CROSS-RECESS, PH
	X99-0295-000		3	SCREW, CROSS-RECESS, PH
	X99-0304-000		1	SCREW, CROSS-RECESS, FCH
	X99-0305-000		1	SCREW, CROSS-RECESS, FCH

CANON AL-1, BLACK AL-1



CAI-3597-000 detail



A	SIZE
9.00 mm (010)	
9.15 mm (020) Main	

REF. NO. C12-1821,2

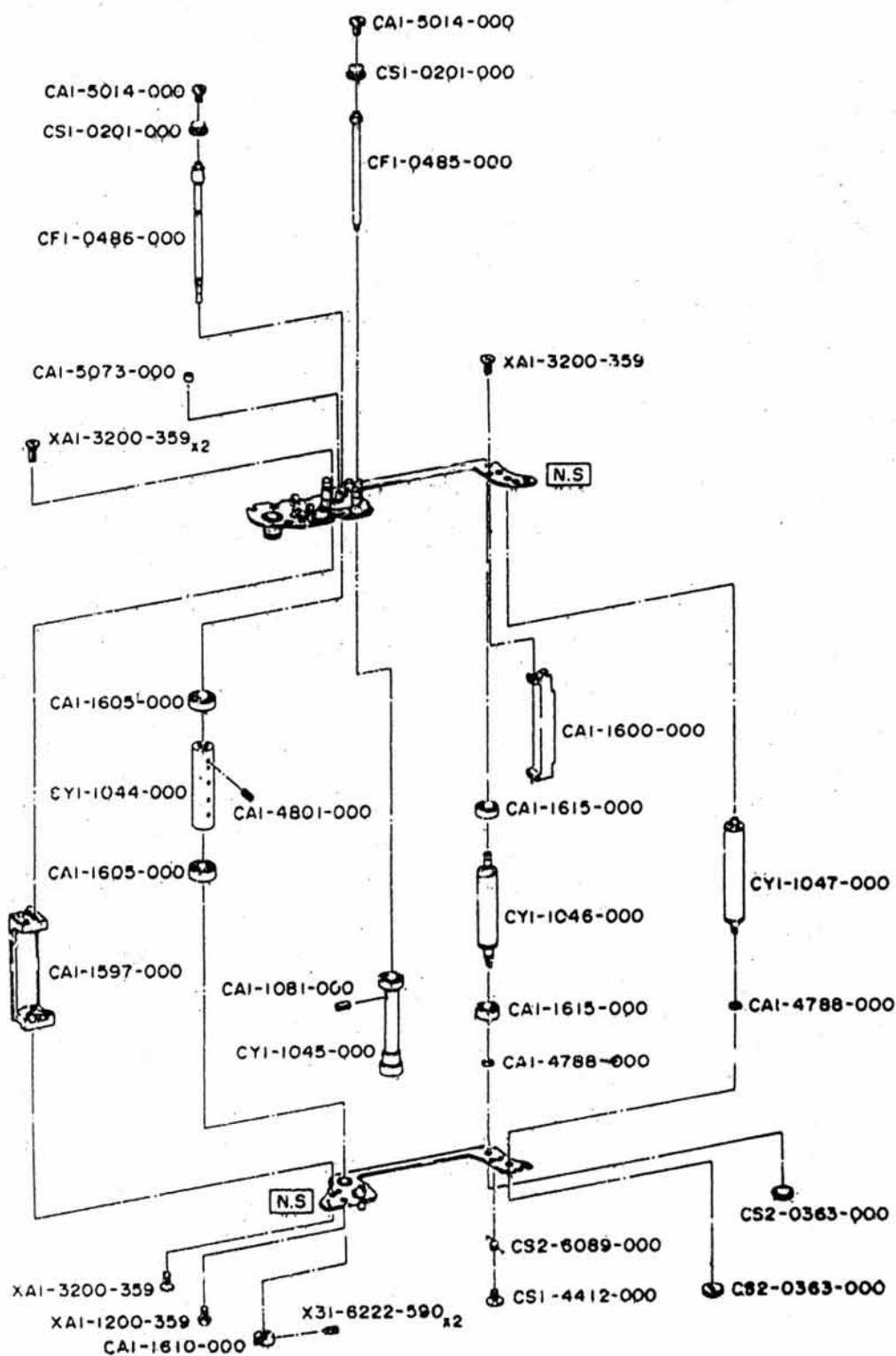
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PARTS LIST

SHUTTER PART

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-1633-000	E	1	STUD
	CA1-1635-000	E	1	SCREW, SLOTTED, SHOULDER
	CA1-1638-000	E	1	LEVER
	CA1-1642-000	D	1	E RING
	CA1-1643-000	D	1	WASHER
	CA1-3381-000	C	1	RETAINER
	CA1-3397-000	E	1	LEVER, 1ST CURTAIN LATCH
	(ENTER SIZE WHEN ORDERING, SEE DETAIL)			
	CF1-0484-000	E	1	SHIELD, LIGHT
	CF1-0492-000	B	1	MAGNET, SHUTTER
	CF1-0852-000	D	1	LEVER, ARMATURE
	CS1-0197-000	E	2	GEAR
	CS1-0198-000	E	1	GEAR
	CS1-0200-000	E	1	GEAR
	CS1-0202-000	E	1	GEAR IDLER
	CS1-6207-000	E	1	SPRING
	CS1-6208-000	E	1	SPRING
	CS1-6209-000	E	1	SPRING
	CS1-6213-000	E	1	SPRING
	CS1-6465-000	E	1	SPRING
	CS1-6466-000	E	1	SPRING
	CS2-0354-000	D	1	GEAR, IDLER
	CS2-6091-000	D	1	SPRING
	CY1-1040-000	D	1	BASE, BRAKE
	CY1-1041-000	D	1	2ND CURTAIN BRAKE
	CY1-1042-000	C	1	CONTACT
	CY1-1043-000	C	2	CURTAIN
	XA1-1140-169		2	SCREW, CROSS-RECESS, PH
	XA1-3170-359		1	SCREW, CROSS-RECESS, FCH
	X02-1100-132		1	E RING
	X61-7215-000		1	CORE, MAGNET
	X61-7216-000		1	ARMATURE
	X71-9749-000		1	RETAINER
	X71-9750-000		1	RETAINER
	X91-1436-200		1	SCREW, CROSS-RECESS, PH
	X91-1736-250		2	SCREW, CROSS-RECESS, PH

CANON AL-1, BLACK AL-1



REF.NO.C12-1821,2

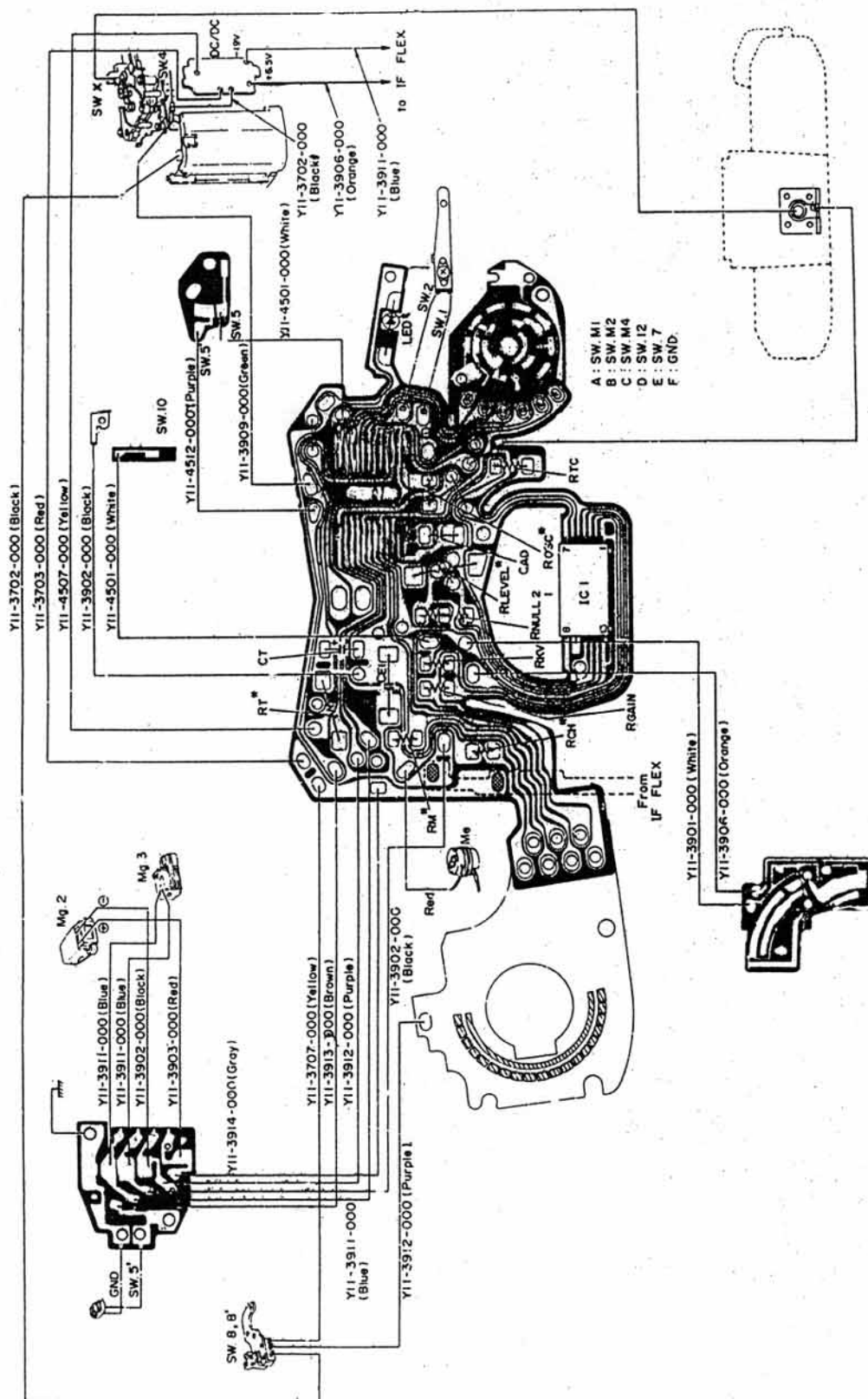
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PARTS LIST

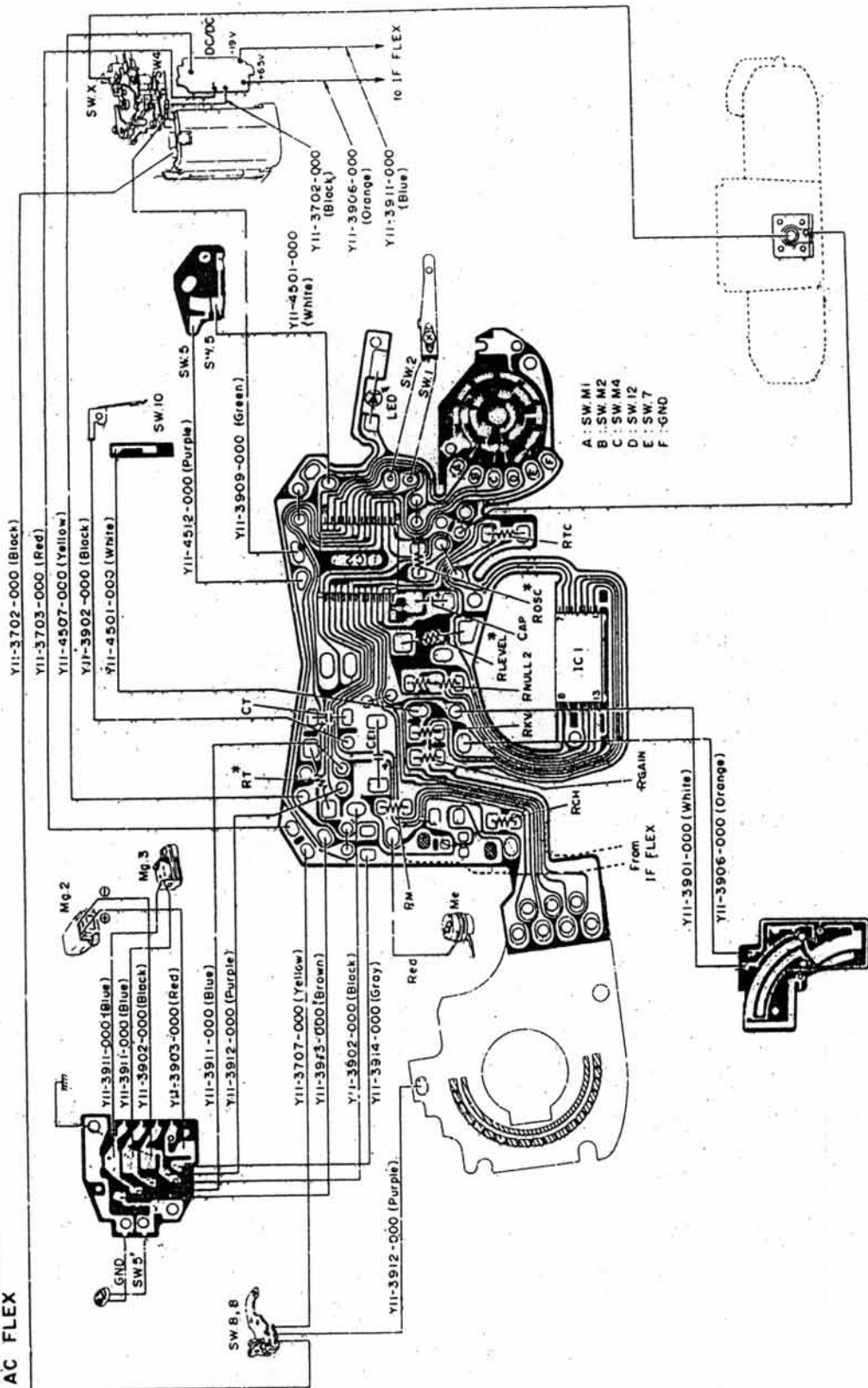
SHUTTER PART 2

MARK	PART NO.	CLASS	QTY	DESCRIPTION
	CA1-1081-000	E	1	PIN, SPRING
	CA1-1397-000	E	1	MEMBER, VERTICAL
	CA1-1600-000	E	1	MEMBER, VERTICAL
	CA1-1603-000	E	2	PULLEY
	CA1-1610-000	E	1	CAM, CURTAIN LATCH
	CA1-1613-000	E	2	PULLEY
	CA1-4788-000	E	2	WASHER
	CA1-4801-000	E	1	SCREW, ALIGNMENT PIN
	CA1-5014-000	E	2	SCREW
	CA1-5073-000	E	1	SHOCK ABSORBER
	CF1-0485-000	E	1	SHAFT, 1ST DRUM
	CF1-0486-000	E	1	SHAFT, 2ND DRUM
	CS1-0201-000	E	2	GEAR, PINION
	CS1-4412-000	E	1	SCREW
	CS2-0363-000	E	2	GEAR
	CS2-6089-000	E	1	SPRING
	CY1-1044-000	E	1	DRUM, 2ND CURTAIN
	CY1-1045-000	E	1	ROLLER, 1ST CURTAIN
	CY1-1046-000	E	1	SPRING DRUM, 1ST CURTAIN
	CY1-1047-000	E	1	SPRING DRUM, 2ND CURTAIN
	XA1-1200-359		1	SCREW, CROSS-RECESS, PH
	XA1-3200-359		4	SCREW, CROSS-RECESS, FCH
	X31-6222-590		2	SETSCREW, HEXAGON SOCKET, HLHP

CANON AL-1, BLACK AL-1



**ELECTRIC PARTS UNIT
WIRING DIAGRAM
AC FLEX**



PARTS LIST

ELECTRIC PARTS & LEADS

SYMBOL	PART NO.	CLASS	DESCRIPTION	REMARKS
C100			CAPACITOR, CERA.	0.01 uF 25V
C101			CAPACITOR, CERA.	1000 PF 25V
C102			CAPACITOR, CERA.	0.1 PF 15V
C103			CAPACITOR, CERA.	0.01 uF 25V
C104			CAPACITOR, TANTA.	6.8 uF 10V
C105			CAPACITOR, TANTA.	0.1 uF 35V
C106			CAPACITOR, CERA.	0.15 uF 16V
C107			CAPACITOR, TANTA.	2.2 uF 10V
C108			CAPACITOR, CERA.	0.1 uF 25V
C109			CAPACITOR, CERA.	0.1 uF 15V
C110			CAPACITOR, TANTA.	22 uF 10V
C111			CAPACITOR, CERA.	0.1 uF 25V
C112			CAPACITOR, CERA.	0.1 uF 25V
C113			CAPACITOR, CERA.	0.1 uF 25V
CA0			CAPACITOR, TANTA.	1 uF 20V
CE1			CAPACITOR, TANTA.	22 uF 10V
CT			CAPACITOR, TANTA.	0.022 uF 35V
D100				
IC1	CH4-0039-000	D	IC	T2682
IC2	CH4-0075-000	C	IC	T1549
IC100	CH4-0074-000	C	IC	SN28834
IC101	CH4-0073-000	C	IC	SN28833
LED	CH4-0071-000	E	LED	LS003EC
LED	CH4-0076-000	E	LED	PR2202S
R100	VR9-1663-000	E	RESISTOR	3.6KOHM, 1/8W
R101	VR9-2106-000	E	RESISTOR	4.42 KOHM, 1/8W
R102	VR9-2107-000	E	RESISTOR	4.53 KOHM, 1/8W
R103	VR9-1943-000	E	RESISTOR	4.64 KOHM, 1/8W
	VR9-0490-000	E	RESISTOR	4.75 KOHM, 1/8W
	VR9-1944-000	E	RESISTOR	4.87 KOHM, 1/8W
	VR9-1945-000	E	RESISTOR	4.99 KOHM, 1/8W
	VR9-1946-000	E	RESISTOR	5.11 KOHM, 1/8W
	VR9-1947-000	E	RESISTOR	5.23 KOHM, 1/8W
	VR9-1948-000	E	RESISTOR	5.30 KOHM, 1/8W
	VR9-1949-000	E	RESISTOR	5.49 KOHM, 1/8W
	VR9-1950-000	E	RESISTOR	5.62 KOHM, 1/8W
	VR9-1951-000	E	RESISTOR	5.76 KOHM, 1/8W
	VR9-1952-000	E	RESISTOR	5.90 KOHM, 1/8W
	VR9-1953-000	E	RESISTOR	6.04 KOHM, 1/8W
	VR9-1954-000	E	RESISTOR	6.19 KOHM, 1/8W
	VR9-1955-000	E	RESISTOR	6.34 KOHM, 1/8W
	VR9-1956-000	E	RESISTOR	6.49 KOHM, 1/8W
	VR9-1957-000	E	RESISTOR	6.65 KOHM, 1/8W
	VR9-1958-000	E	RESISTOR	6.81 KOHM, 1/8W
	VR9-1959-000	E	RESISTOR	6.98 KOHM, 1/8W
	VR9-1911-000	E	RESISTOR	7.15 KOHM, 1/8W
	VR9-1912-000	E	RESISTOR	7.32 KOHM, 1/8W
	VR9-1913-000	E	RESISTOR	7.50 KOHM, 1/8W
	VR9-1914-000	E	RESISTOR	7.68 KOHM, 1/8W
	VR9-1915-000	E	RESISTOR	7.87 KOHM, 1/8W
	VR9-1916-000	E	RESISTOR	8.06 KOHM, 1/8W
	VR9-1917-000	E	RESISTOR	8.25 KOHM, 1/8W
	VR9-1918-000	E	RESISTOR	8.45 KOHM, 1/8W
	VR9-1919-000	E	RESISTOR	8.66 KOHM, 1/8W
	VR9-1920-000	E	RESISTOR	8.87 KOHM, 1/8W
	VR9-1921-000	E	RESISTOR	9.09 KOHM, 1/8W
	VR9-1922-000	E	RESISTOR	9.31 KOHM, 1/8W

PARTS LIST

ELECTRIC PARTS & LEADS

SYMBOL	PART NO	CLASS	DESCRIPTION	REMARKS
	VR9-1923-000	E	RESISTOR	9.53 KOHM, 1/8W
	VR9-1924-000	E	RESISTOR	9.76 KOHM, 1/8W
	VR9-0350-000	E	RESISTOR	10.0 KOHM, 1/8W
	VR9-0328-000	E	RESISTOR	10.2 KOHM, 1/8W
	VR9-0429-000	E	RESISTOR	10.5 KOHM, 1/8W
	VR9-0430-000	E	RESISTOR	10.7 KOHM, 1/8W
	VR9-0431-000	E	RESISTOR	11.0 KOHM, 1/8W
	VR9-0432-000	E	RESISTOR	11.3 KOHM, 1/8W
	VR9-0433-000	E	RESISTOR	11.5 KOHM, 1/8W
	VR9-0434-000	E	RESISTOR	11.8 KOHM, 1/8W
	VR9-0435-000	E	RESISTOR	12.1 KOHM, 1/8W
	VR9-0436-000	E	RESISTOR	12.4 KOHM, 1/8W
	VR9-0437-000	E	RESISTOR	12.7 KOHM, 1/8W
	VR9-0438-000	E	RESISTOR	13.0 KOHM, 1/8W
	VR9-0439-000	E	RESISTOR	13.3 KOHM, 1/8W
	VR9-0440-000	E	RESISTOR	13.7 KOHM, 1/8W
	VR9-1939-000	E	RESISTOR	14.0 KOHM, 1/8W
	VR9-1940-000	E	RESISTOR	14.3 KOHM, 1/8W
	VR9-1941-000	E	RESISTOR	14.7 KOHM, 1/8W
	VR9-1942-000	E	RESISTOR	15.0 KOHM, 1/8W
	VR9-2108-000	E	RESISTOR	15.4 KOHM, 1/8W
	VR9-2109-000	E	RESISTOR	15.8 KOHM, 1/8W
	VR9-2110-000	E	RESISTOR	16.2 KOHM, 1/8W
	VR9-2111-000	E	RESISTOR	16.5 KOHM, 1/8W
	VR9-2112-000	E	RESISTOR	16.9 KOHM, 1/8W
	VR9-2113-000	E	RESISTOR	17.4 KOHM, 1/8W
	VR9-2114-000	E	RESISTOR	17.8 KOHM, 1/8W
	VR9-2115-000	E	RESISTOR	18.2 KOHM, 1/8W
	VR9-2083-000	E	RESISTOR	18.7 KOHM, 1/8W
	VR9-2116-000	E	RESISTOR	19.1 KOHM, 1/8W
	VR9-2117-000	E	RESISTOR	19.6 KOHM, 1/8W
	VR9-2118-000	E	RESISTOR	20.0 KOHM, 1/8W
R104			RESISTOR	62 KOHM, 1/8W
R105	VR9-1886-000	E	RESISTOR	20 KOHM, 1/8W
R105	VR9-1099-000	D	RESISTOR	22 KOHM, 1/8W
R105	VR9-1887-000	E	RESISTOR	24 KOHM, 1/8W
R105	VR9-1888-000	E	RESISTOR	27 KOHM, 1/8W
R105	VR9-1889-000	E	RESISTOR	30 KOHM, 1/8W
R105	VR9-1103-000	D	RESISTOR	33 KOHM, 1/8W
R105	VR9-1891-000	E	RESISTOR	36 KOHM, 1/8W
R105	VR9-1892-000	E	RESISTOR	39 KOHM, 1/8W
R105	VR9-1753-000	E	RESISTOR	47 KOHM, 1/8W
R105	VR9-1476-000	E	RESISTOR	51 KOHM, 1/8W
R105	VR9-1109-000	D	RESISTOR	56 KOHM, 1/8W
R105	VR9-1897-000	E	RESISTOR	68 KOHM, 1/8W
R105	VR9-1899-000	E	RESISTOR	82 KOHM, 1/8W
R105	VR9-1412-000	E	RESISTOR	91 KOHM, 1/8W
R105	VR9-2097-000	E	RESISTOR	110 KOHM, 1/8W
R105	VR9-2098-000	E	RESISTOR	130 KOHM, 1/8W
R105	VR9-1969-000	E	RESISTOR	150 KOHM, 1/8W
R105	VR9-2099-000	E	RESISTOR	180 KOHM, 1/8W
R105	VR9-1754-000	E	RESISTOR	220 KOHM, 1/8W
R105	VR9-2100-000	E	RESISTOR	270 KOHM, 1/8W
R105	VR9-2101-000	E	RESISTOR	360 KOHM, 1/8W
R105	VR9-2102-000	E	RESISTOR	680 KOHM, 1/8W
R105	VR9-2103-000	E	RESISTOR	1 MOHM, 1/8W
R106	VR9-1901-000	E	RESISTOR	120 KOHM, 1/8W
R107	VR9-1903-000	E	RESISTOR	820 OHM, 1/8W
R108	VR9-1324-000	E	RESISTOR	470 OHM, 1/8W
R109	VR9-1903-000	E	RESISTOR	820 OHM, 1/8W
R110	VR9-1115-000	E	RESISTOR	100 KOHM, 1/8W

PARTS LIST

ELECTRIC PARTS & LEADS

SYMBOL	PART NO.	CLASS	DESCRIPTION	REMARKS
RCH	VR9-1868-000	E	RESISTOR	3.16 KOHM, 1/8W
RCH	VR9-1869-000	E	RESISTOR	3.24 KOHM, 1/8W
RCH	VR9-1870-000	E	RESISTOR	3.32 KOHM, 1/8W
RCH	VR9-1871-000	E	RESISTOR	3.40 KOHM, 1/8W
RCH	VR9-1872-000	E	RESISTOR	3.48 KOHM, 1/8W
RCH	VR9-1873-000	E	RESISTOR	3.57 KOHM, 1/8W
RCH	VR9-1874-000	E	RESISTOR	3.65 KOHM, 1/8W
RCH	VR9-1875-000	E	RESISTOR	3.74 KOHM, 1/8W
RCH	VR9-1876-000	E	RESISTOR	3.83 KOHM, 1/8W
RCH	VR9-1877-000	E	RESISTOR	3.92 KOHM, 1/8W
RCH	VR9-1325-000	D	RESISTOR	4.02 KOHM, 1/8W
RGAIN	VR9-1422-000	E	RESISTOR	5.76 KOHM, 1/8W
RGAIN	VR9-1423-000	E	RESISTOR	5.90 KOHM, 1/8W
RGAIN	VR9-1424-000	E	RESISTOR	6.04 KOHM, 1/8W
RGAIN	VR9-1425-000	E	RESISTOR	6.19 KOHM, 1/8W
RGAIN	VR9-1426-000	E	RESISTOR	6.34 KOHM, 1/8W
RGAIN	VR9-1427-000	E	RESISTOR	6.49 KOHM, 1/8W
RKV	VR9-1412-000	E	RESISTOR	91 KOHM, 1/8W
RLEVEL	VR9-0086-000	E	RESISTOR	62 KOHM, 1/8W
RLEVEL	VR9-0087-000	D	RESISTOR	68 KOHM, 1/8W
RLEVEL	VR9-0513-000	E	RESISTOR	75 KOHM, 1/8W
RLEVEL	VR9-0089-000	D	RESISTOR	82 KOHM, 1/8W
RLEVEL	VR9-0090-000	D	RESISTOR	91 KOHM, 1/8W
RLEVEL	VR9-0826-000	E	RESISTOR	100 KOHM, 1/8W
RLEVEL	VR9-0521-000	E	RESISTOR	110 KOHM, 1/8W
RLEVEL	VR9-0093-000	D	RESISTOR	120 KOHM, 1/8W
RLEVEL	VR9-0094-000	E	RESISTOR	130 KOHM, 1/8W
RLEVEL	VR9-0075-000	E	RESISTOR	150 KOHM, 1/8W
RLEVEL	VR9-0096-000	E	RESISTOR	160 KOHM, 1/8W
RLEVEL	VR9-0097-000	E	RESISTOR	180 KOHM, 1/8W
RLEVEL	VR9-0412-000	E	RESISTOR	200 KOHM, 1/8W
RLEVEL	VR9-0297-000	E	RESISTOR	220 KOHM, 1/8W
RLEVEL	VR9-0413-000	E	RESISTOR	240 KOHM, 1/8W
RLEVEL	VR9-0373-000	D	RESISTOR	270 KOHM, 1/8W
RLEVEL	VR9-0414-000	E	RESISTOR	300 KOHM, 1/8W
RLEVEL	VR9-0415-000	E	RESISTOR	330 KOHM, 1/8W
RLEVEL	VR9-0296-000	E	RESISTOR	360 KOHM, 1/8W
RLEVEL	VR9-0416-000	E	RESISTOR	390 KOHM, 1/8W
RLEVEL	VR9-0417-000	E	RESISTOR	430 KOHM, 1/8W
RLEVEL	VR9-0418-000	E	RESISTOR	470 KOHM, 1/8W
RLEVEL	VR9-0419-000	E	RESISTOR	510 KOHM, 1/8W
RM	VR9-1437-000	E	RESISTOR	2.74 KOHM, 1/8W
RM	VR9-1438-000	E	RESISTOR	2.80 KOHM, 1/8W
RM	VR9-1439-000	E	RESISTOR	2.87 KOHM, 1/8W
RM	VR9-1440-000	E	RESISTOR	2.94 KOHM, 1/8W
RNULL	VR9-1091-000	D	RESISTOR	10 KOHM, 1/8W
RNULL	VR9-1093-000	D	RESISTOR	12 KOHM, 1/8W
RNULL	VR9-1095-000	D	RESISTOR	15 KOHM, 1/8W
RNULL	VR9-1097-000	D	RESISTOR	18 KOHM, 1/8W
RNULL	VR9-1099-000	D	RESISTOR	22 KOHM, 1/8W
RNULL	VR9-1103-000	D	RESISTOR	33 KOHM, 1/8W
RNULL	VR9-1109-000	D	RESISTOR	56 KOHM, 1/8W
RNULL	VR9-1115-000	D	RESISTOR	100 KOHM, 1/8W
ROSC	VR9-1295-000	E	RESISTOR	51.1 KOHM, 1/8W
ROSC	VR9-1297-000	E	RESISTOR	56.2 KOHM, 1/8W
ROSC	VR9-1299-000	D	RESISTOR	61.9 KOHM, 1/8W
ROSC	VR9-1301-000	D	RESISTOR	68.1 KOHM, 1/8W
ROSC	VR9-1303-000	D	RESISTOR	75.0 KOHM, 1/8W
ROSC	VR9-1305-000	D	RESISTOR	82.5 KOHM, 1/8W
ROSC	VR9-1307-000	C	RESISTOR	90.9 KOHM, 1/8W
ROSC	VR9-1309-000	D	RESISTOR	100 KOHM, 1/8W

PARTS LIST

ELECTRIC PARTS & LEADS

SYMBOL	PART NO.	CLASS	DESCRIPTION	REMARKS
ROSC	VR9-1311-000	D	RESISTOR	110 KOHM, 1/8W
ROSC	VR9-1313-000	D	RESISTOR	121 KOHM, 1/8W
ROSC	VR9-1315-000	D	RESISTOR	133 KOHM, 1/8W
ROSC	VR9-1317-000	D	RESISTOR	147 KOHM, 1/8W
ROSC	VR9-1319-000	E	RESISTOR	162 KOHM, 1/8W
ROSC	VR9-1321-000	E	RESISTOR	178 KOHM, 1/8W
RT	VR9-0144-000	D	RESISTOR	10 KOHM, 1/8W
RT	VR9-0128-000	D	RESISTOR	11 KOHM, 1/8W
RT	VR9-0287-000	E	RESISTOR	12 KOHM, 1/8W
RT	VR9-0438-000	E	RESISTOR	13 KOHM, 1/8W
RT	VR9-0192-000	D	RESISTOR	15 KOHM, 1/8W
RT	VR9-0372-000	D	RESISTOR	16 KOHM, 1/8W
RT	VR9-0004-000	E	RESISTOR	18 KOHM, 1/8W
RT	VR9-0012-000	E	RESISTOR	20 KOHM, 1/8W
RT	VR9-0006-000	D	RESISTOR	22 KOHM, 1/8W
RT	VR9-0411-000	E	RESISTOR	24 KOHM, 1/8W
RT	VR9-0078-000	E	RESISTOR	27 KOHM, 1/8W
RT	VR9-0079-000	E	RESISTOR	30 KOHM, 1/8W
RT	VR9-0080-000	D	RESISTOR	33 KOHM, 1/8W
RT	VR9-0081-000	E	RESISTOR	36 KOHM, 1/8W
RT	VR9-0082-000	E	RESISTOR	39 KOHM, 1/8W
RT	VR9-0083-000	D	RESISTOR	43 KOHM, 1/8W
RT	VR9-0084-000	D	RESISTOR	47 KOHM, 1/8W
RT	VR9-0100-000	D	RESISTOR	51 KOHM, 1/8W
RT	VR9-0085-000	E	RESISTOR	56 KOHM, 1/8W
RT	VR9-0086-000	E	RESISTOR	62 KOHM, 1/8W
RT	VR9-0087-000	D	RESISTOR	68 KOHM, 1/8W
RT	VR9-0513-000	D	RESISTOR	75 KOHM, 1/8W
RT	VR9-0089-000	D	RESISTOR	82 KOHM, 1/8W
RT	VR9-0090-000	D	RESISTOR	91 KOHM, 1/8W
RT	VR9-0826-000	D	RESISTOR	100 KOHM, 1/8W
RT	VR9-0521-000	E	RESISTOR	110 KOHM, 1/8W
RT	VR9-0092-000	D	RESISTOR	120 KOHM, 1/8W
RT	VR9-0094-000	E	RESISTOR	130 KOHM, 1/8W
RT	VR9-0095-000	E	RESISTOR	150 KOHM, 1/8W
RTC				4 KOHM, 1/8W
XTAL	WK2-0037-000	D	OSCILLATOR, CRYSTAL	KF-38DS 32.968KH
	Y11-3702-000		LEAD (BLACK)	
	Y11-3703-000		LEAD (RED)	
	Y11-3707-000		LEAD (YELLOW)	
	Y11-3711-000		LEAD (BLUE)	
	Y11-3901-000		LEAD (WHITE)	
	Y11-3902-000		LEAD (BLACK)	
	Y11-3903-000		LEAD (RED)	
	Y11-3906-000		LEAD (ORANGE)	
	Y11-3909-000		LEAD (GREEN)	
	Y11-3911-000		LEAD (BLUE)	
	Y11-3912-000		LEAD (PURPLE)	
	Y11-3913-000		LEAD (BROWN)	
	Y11-3914-000		LEAD (GRAY)	
	Y11-4501-000		LEAD (WHITE)	
	Y11-4507-000		LEAD (YELLOW)	
	Y11-4512-000		LEAD (PURPLE)	

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	CA1-1228-000	5	B-1,2		CA1-3398-000	1	A-7,8
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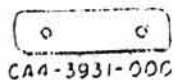
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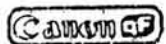
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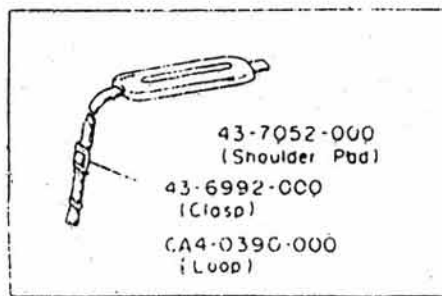
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CS1-8440-000

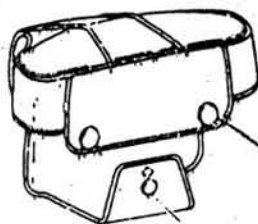


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CA4-0390-000
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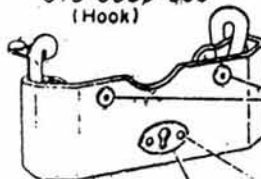
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CY3-0005-000
(Hook)

CY3-0004-000
(Hook)

CY3-0003-000
(Hook)



CY3-0005-000
(Hook)

CY3-0007-000
(Rivet)

CY3-0006-000
(Hook Catcher)

REF. NO. C46-1151,2

CASE PARTS LIST

NEW	PART NO	CLASS	QTY	DESCRIPTION
	43-6992-000	D	1	CLASP
	43-7052-000	D	1	PAD, SHOULDER
	CA4-0390-000	D	1	LOOP
	CA4-3931-000	E	1	WASEA, NAMEPLATE
	CS1-8440-000	E	1	NAME PLATE FOR CASE
	CY3-0004-000	D	1	HOOK
	CY3-0003-000	D	1	HOOK
	CY3-0006-000	D	1	HOOK CATCHER
	CY3-0007-000	D	1	RIVET
	CY3-0009-000	E	1	HOOK